STYLE GUIDE FOR

THESES AND DISSERTATIONS

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STYLE GUIDE

FOR

AFIT THESES AND DISSERTATIONS

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Introduction

The <u>AFIT Style Guide for Theses and Dissertations</u> contains guidance for preparing AFIT theses and dissertations; these documents are an important part of the Institute's graduate degree requirements. In this guide you will find detailed information about such topics as the systems of documentation used at AFIT, the formats of graphics and equations to convey technical information, the formats of AFIT theses and dissertations, and the steps necessary to prepare and submit these documents.

As you prepare your thesis, you should realize that there are a number of aspects of format and features that are to be followed. Illustrations and equations must be presented in a consistent and standardized format. The appearance of chapter titles and subheadings within chapters is also standardized. Tables of Contents and Lists of Illustrations are required. These prefatory items are also presented in a standard format. This guide will help you establish the correct formats for these features. We strongly recommend that you learn and adopt the preferred formats early in the thesis-writing process; following preferred formats from the beginning will save you time preparing your report in the long run.

The <u>AFIT Style Guide</u> begins with an overview of the thesis and dissertation, suggesting methods of obtaining research topics and indicating the logical sequence of the separate chapters of the thesis or dissertation. Chapters 2 through 4 describe procedures for finding and documenting information relating to your research subject. Chapters 5 and 6 discuss aspects of format and visual presentation of material. Chapters 7, 8, and 9 address seemingly minor but essential tasks associated with the proper completion of your thesis or dissertation. Sample pages from theses and dissertations are included in an attachment. Finally, the <u>AFIT Style Guide</u> includes an index for ease of locating items discussed.

To understand how the guide can help you, it is important to understand what it is *not* intended to do. Specifically, it is *not* intended to be a general grammar or usage manual, *nor* is it intended to be a typing or word-processing manual. The purpose of this guide is to provide information about the conventions of AFIT theses and dissertations and to provide help in preparing those documents.

Occasionally a thesis or dissertation advisor will require a variation from the formats described in this guide. Unless so directed by your advisor, you should follow the guidance given here. It will help you produce a report in which you can take pride, and it will ensure that the final submittal of the thesis or dissertation is successful.

This <u>Style Guide</u> has evolved over many years and has been shaped and modified by the ideas and contributions of many AFIT instructors and students. Those who were responsible for earlier versions include Dr. Richard Davis, Dr. Robert Weaver, and Dr. Richard Fenno. This guide continues to evolve, responding to changes in print technology, faculty desires, and reader needs. The current editor, Dr. David K. Vaughan, AFIT/LAC, solicits all suggestions for improvements.

CHAPTER 1

Overview of the Thesis Process

The primary purpose of the thesis program is for the students to conduct a research project of adequate complexity to demonstrate their competence in and understanding of the various aspects of the research process. These are some of the *important aspects* associated with the research process:

1. To do sound research in an appropriate field; to define and limit a problem, to find and review the pertinent literature, to develop an approach to the solution, to develop a realistic research schedule, and to carry out the steps necessary to solve the problem.

2. To demonstrate the rigor and care required in conducting productive research; to realize the time and work involved, and to appreciate some of the problems that can arise.

3. To prepare a research report that will present the results of the study—the problem addressed, the methodology used, the results obtained, the conclusions reached, and the recommendations developed.

The thesis project is a combination of both process and product: it is a process in that it involves planning, conducting, and managing research activities. It is a product in that it requires the writing of a report that describes the research conducted. Students do not conduct their research completely independently, however; they learn to do research through the instruction and guidance of advisors, and through other faculty members as well.

AFIT thesis research is not a "make work" exercise; it addresses real world problems. While most master's degree programs require theses, the AFIT thesis program is unique in that it is intended to provide students the opportunity to learn to do research on problems of real interest to the Air Force and other defense agencies. The research conducted by students can also relate to students' personal interests and professional goals, especially as they are linked to their defense careers. Thus, the AFIT thesis program offers a valuable opportunity for students to combine academic study and personal fulfillment.

Everyone hopes that the problem selected will be solved and that the results of the study will be of substantial value to the Department of Defense or appropriate sponsoring agency. But such fortunate results do not always occur.

The lack of a well-defined solution to the problem does not necessarily mean that the primary objectives of the thesis were not attained, or that the thesis project was not a success. Inconclusive results are sometimes as informative as precise answers. If the problem has been well defined, if the research area has been carefully investigated, and if the report has been effectively written, the student will satisfactorily have completed the thesis research process.

Sources of Topics

Workable research topics can come from a variety of sources. Some of the *most common* are:

1. *The Thesis Topic Book.* This book contains topics suggested by the faculty, other advisors, and outside organizations as potential topics for thesis research. Each topic is described on a separate page, and the pages are organized according to topic areas. Copies of the book are available to LA students in the AFIT library and in the Department of Research and Consulting (LAC).

2. *Faculty.* Students may become interested in a particular subject or general subject area as a result of assigned reading or classroom discussion in a course. A student may be referred to an advisor because a faculty member knows that the advisor is doing research in the general area of the student's interest.

3. *Air University Research Topics.* Air University and AFIT solicit research topics from the Air Force and other DOD agencies. These are published in a single volume which includes a brief description of each topic and a point of contact for each topic. Some of the topics are suitable for student research. The listing is maintained in the AFIT Library.

4. *Air Force Logistics Management Agency.* The Air Force Logistics Management Agency (AFLMA) at Gunter AFB is chartered to study, develop, test, evaluate, and help implement policies, procedures, and systems which can improve logistics-related functions and activities. It sponsors student research, and students are provided with DSN numbers for the various AFLMA directorates during their summer research orientation.

5. *Air Force Laboratories.* Many Air Force Laboratories, located at Wright-Patterson AFB and elsewhere, actively solicit AFIT assistance in conducting research in support of their projects.

6. *Special Presentations.* Students often attend special presentations by guest speakers related to students' areas of specialization. These are usually arranged by the program or option manager, and in some cases the students visit the AF unit concerned to hear an "in house" presentation of potential research topics by the people suggesting them.

7. *Previously Completed Theses.* Previously completed thesis reports offer a good source of research topics. Theses usually conclude with recommendations for further research in the subject area and provide specific recommendations for research based on the experience of the researchers. Copies of AFIT theses are available in the library. In addition, when oral presentations of thesis research are made by students in one class, students in the succeeding class have the opportunity to discuss specific recommendations for continuing research with the students who make them.

8. *Personal Experience.* Some students already have research topics in mind when they arrive. Because the student has an interest in and personal knowledge of the problem area, these can be productive and useful subjects for thesis research.

Selecting a Thesis Advisor

In EN, students work singly or in teams. EN thesis committees consist of the advisor and two additional faculty members, of which one adjunct faculty member may be included. Additional members may be added if desired. In LA, students normally work individually; occasionally they may be allowed to work in teams; each student or thesis pair typically works with an advising committee, which consists of at least two faculty members, one of whom must be fully qualified. One committee member must be from the LA graduate faculty. The Thesis Advisor List is the official list of people approved to serve as thesis advisors. This annually updated list contains each faculty member's advising status and research interests and is available to students in the AFIT library and LAC.

Students typically approach a potential advisor with a general topic area—and sometimes a specific topic—in mind. It is appropriate for students to discuss their topics with several potential advisors before making a final decision. Discussing potential topic areas with a variety of potential advisors can help the students clarify the research issues and determine which advisor-student match will provide the happiest result. A successful match is important to success in the AFIT program, for the student-advisor relationship will continue throughout the full time of the students' program at AFIT.

Agreement to advise a thesis topic can be reached early in the program, especially if students are able to determine the topic area. The advisor should determine that the project agreed upon is appropriate for thesis research.

These are some *useful criteria for evaluating the research topic:*

1. The problem is one of valid interest to the Air Force or another DOD component.

2. The problem is manageable and appropriate for the student's degree and specialization. Whenever possible, students should select topics related to their areas of specialization.

3. The bulk of the research effort is in the advisor's area of specialization. Although other faculty members can be called upon for special expertise, if the main body of research is not within the prospective advisor's area of competence, he or she will suggest that the student solicit the assistance of an additional faculty member in the area concerned.

4. The project is sufficiently limited that the student can complete the research and produce the report in the time available. Inexperienced researchers tend to underestimate the time required to conduct research. When students propose topics that are too large, the advisor will help the student limit the scope of the research. If the scope of a good problem cannot be reduced effectively, the advisor may choose to divide it into two separate projects.

5. Necessary data and information are available and accessible. Classified or difficult-to-obtain information may hinder the research.

6. The research does not call for substantial student TDY time or expense. Some travel money is available through school administrative offices, but it is limited. If students anticipate significant TDY travel, they should seek DOD sponsor support.

Students may ask other faculty members to read drafts of their theses in various stages of preparation. The participation of these other readers may be informal or formal; that is, the feedback these readers give may or may not affect the students' grades. Students should be clear in their own minds about which readers will be contributing to the thesis grade.

Sponsored Research

Every year many Air Force and other DOD organizations agree to sponsor AFIT research. Students are encouraged to seek sponsorship and to select a research topic suggested by one of these organizations. Before contacting sponsors, however, students should firmly define their areas of interest and identify as clearly as possible the scope and focus of their research efforts.

Students should not approach sponsors until their research plans are well-defined. When a precise, clearly-formulated research plan has been developed, students should then contact the appropriate individuals in the sponsoring organization. Faculty advisors or administrative personnel may be able to assist in identifying contacts.

Sponsors should be strongly interested in the results of the research; otherwise, sponsor support will be minimal to non-existent. Sponsors can assist students by providing or generating data necessary to complete research. Data may already exist in the databases of the sponsoring organizations, or the sponsor may assist in obtaining data. If data have to be generated, the sponsor may agree to write letters encouraging sponsor employees, the Air Force Military Personnel Center (AFMPC), or affiliated organizations to provide data through responses to questionnaires or interviews. Sponsors may provide funds enabling visits to sites or individuals crucial to the successful collection of data. Sponsors may provide funds for the purchase of software or specialized equipment. Sponsors sometimes provide laboratory space, equipment, and subjects. Finally, sponsors may request end-of-project briefings to learn firsthand the results of the research-gathering and analysis efforts. Any travel expenses associated with these briefings are usually paid for by the sponsor.

Topics sponsored by outside organizations can be described in three categories which reflect the degree of commitment and interaction that exists between AFIT and the sponsoring organization. These categories are:

1. *Category 1.* These research topics have been funded by the sponsor or have been formally agreed to by AFIT and the sponsor. They have the highest level of organizational commitment. Often, students researching these topics receive access to hardware and software unavailable to other students. Funding for TDY and other expenses is usually provided by the sponsoring organization.

2. *Category 2.* Topics in this category have been suggested by a sponsor, who tentatively promises to supply funding. However, no formal agreements between AFIT and the sponsoring organization exist. Topics proposed by AFIT faculty members to sponsors usually fall into this category.

3. *Category 3.* These topics are obtained by an annual solicitation of AF and DOD organizations. Although the sponsors typically provide no funding, they do seek AFIT assistance in supporting their missions.

In addition, sponsors can facilitate the collection of data by approving requests to survey agency or command members. AFMPC is reluctant to approve student surveys lacking sponsor approval.

Classified Work

To allow the widest dissemination of information and ideas, students are encouraged to write unclassified theses. However, sponsors sometimes propose research topics that require access to classified information. While it is possible to write a "sanitized" unclassified thesis and present pertinent classified data in a separate report, this option may not be feasible. In such cases, students will have to write classified theses. Security restrictions associated with the handling of classified material may hamper students' ability to do research and to write the thesis.

Before undertaking classified research, students should consult the AFIT Security Managers (Room 102, Bldg 640). These individuals will provide answers to questions concerning the handling of classified material. They will also make a safe available for the storage of classified documents. Security Managers will assist in determining the appropriate classification of the thesis, and they will coordinate the reproduction and distribution of classified theses. Work orders for reproduction and assembly, however, are prepared by the department administrative staff.

Planning the Project

During discussions leading to an agreement between the student and the advisor, each usually develops preliminary ideas about the approach to solving the problem, the identification of the main steps in the process, and the overall timing of the main steps in the process. They may discuss these ideas generally. Later, after the student has completed preparatory courses and conducted a literature review of the problem area, a firm plan of attack can be developed.

In their first two or three quarters, AFIT students enroll in a number of courses that provide the basis for more specialized work later in their programs. These courses provide information pertaining to AFIT library facilities and capabilities and review proper methods of citation and documentation. These courses also typically include literature review assignments that lead students to discover current information published in a given subject area. RSCH 630, Research Methods, offers LA students the opportunity to learn how to design and evaluate research and to produce a research proposal. Other courses in specific academic disciplines are intended to help students focus their research efforts in the appropriate academic area.

General Plan

Most advisors require the student to do substantial background reading about the specific problem before developing a detailed plan of attack, but timing of the accomplishment of the main steps can vary considerably, depending on the nature of the problem, TDY travel, survey preparation, availability of equipment, and individual academic schedules.

Development of a detailed research plan is critical to success. In some ways, it is the single most important factor in thesis success or failure. The plan serves as the enabling document through which both student and advisor can anticipate the necessary research steps, track the progress, and characterize the limiting conditions. Advisors ensure that students apply appropriate research theory and acceptable research practices to specific research problems. When the process works as intended, the student graduates from AFIT with an ability not only to conduct research but also to evaluate the research conducted by others—a skill which will benefit DOD throughout the student's career.

Schedule

An important element of the general research plan is a schedule, or "timeline," for the completion of the project, which the student should develop as part of the plan. The earlier in the project that this timeline is completed, of course, the less exact it can be. Nonetheless, a general schedule of main steps—from locating and reading existing literature through the preparation and submission of an acceptable report—should be developed by the student and agreed to by the advisor early in the project. The timeline, which can be adjusted as the project develops, helps both the student and advisor assess research progress.

Research Proposal

The research proposal provides an overview of the research project, including a statement of the problem to be addressed, a plan for conducting the research, and a preliminary assessment of the outcome. The proposal varies according to the nature of the research project and the research methods employed, but it usually includes the following features: a statement of the specific problem to be studied, background information pertaining to the problem, a review of the specific objectives, a description of the research questions or hypotheses to be analyzed, and a description of the methodology to be used. Although thesis research proposals can be described in a variety of ways, one of the most useful is to think of it as a contract between you (the student) and the school. It describes what you intend to do, and it indicates the school's approval of the research you propose to conduct. Of course, other requirements must be met for the award of your degree in addition to the completion of the thesis, but it is the most important and most challenging AFIT degree requirement.

A good thesis proposal contains the following sections:

1. ***Statement of the Problem.*** This is a crisp, exact statement of the specific problem you intend to solve in your thesis. It should be precise and complete, and it should catch the reader's attention.

2. ***Background.*** The background describes the factors bearing on the problem and may include definitions, facts, criteria, and assumptions. In this section you should indicate clearly the current status of the problem: Is it an old one? Are there recent developments? Will new technologies or methodologies provide an answer?

3. ***Scope.*** In the scope section you should show how and why you have limited your problem. State as precisely as you can what influencing factors you will be examining and indicate as well those factors you will not be examining. Show how and why those factors are important to your research, and indicate the emphasis or value of each. Include a stopping criterion, that measure by which you will know when your research has been completed.

4. ***Research Approach.*** In this section, you will describe the actions and tasks you will need to accomplish to gather the information necessary to answer your research question. The discussion in this section should answer these questions: What do you intend to do? In what sequence? Why? You should relate each task identified here to aspects identified in the scope section, and each investigative question (or subhypothesis) should be linked to the research question (or hypothesis).

5. ***Results.*** If your work succeeds, what is the maximum expected gain your research will show? What is the minimum gain? What is the least result your research will show?

6. ***Timetable.*** A timetable is a schedule, in graphic or narrative form, showing the individual subtasks to be accomplished and the expected date of completion for each. This document is your plan for success.

A good proposal can reduce wasted effort, ensure a steady pace of progress, and provide a quality product in the thesis report.

The Thesis Report

A thesis or dissertation is basically a ***report of research conducted.*** That is, it describes a question that you have asked about some significant issue, the data you have gathered to answer that question, and the results of your data analysis. It is not merely a longer report than you might have written before. Because you are drawing on the ideas of experts in the field and because you have to describe and analyze the data you have collected, you will want to be accurate and thorough in the systems and methods which you use to show your sources and to discuss your findings. Careful presentation of information is crucial if your report is to be accepted by the advisor and the Institute.

The thesis or dissertation is typically constructed according to this five-chapter *model:*

  Chapter 1: Background and Statement of the Problem
  Chapter 2: Literature Review
  Chapter 3: Methodology
  Chapter 4: Data Description and Analysis
  Chapter 5: Findings and Conclusions

It is important to recognize that this five-chapter outline is *only a model.* Not all theses or dissertations consist of five chapters. Some contain more; a few contain less. But all theses or dissertations contain the elements indicated in the model. In addition, almost all theses or dissertations include appendices presenting additional technical material too detailed for easy inclusion in the main chapters. A thesis typically approaches 75-100 pages in length. Some are shorter; some are longer. Most theses contain several illustrations or tables and perhaps a few equations.

Normally, students prepare a first draft of each chapter of the report and submit it to their advisors for comments and suggestions. Typically, drafts of the first three chapters can be completed early in the program; later chapters can be completed only after data have been collected and analyzed. By the time the thesis is due, earlier chapters may have to be revised slightly if the methodology and findings differ from those initially envisioned. The advisors indicate formal acceptance of the thesis by signing the Category and Distribution Memorandum; these signatures verify that the content is accurate and that the document meets acceptable standards of presentation.

When the final draft of the thesis has been read and approved by the advisor and the thesis committee, the thesis is prepared in final form and submitted to the appropriate school administrative office. The school administrative office reviews the document for completeness and consistency of format, including margin widths, headings and titles, and bibliographic form. *When finally approved by the school administrative office, the thesis is considered accepted.*

Often a supporting thesis defense is required. The thesis defense is an oral presentation to the thesis committee and other interested individuals. Most thesis defenses begin with a formal overview of the thesis problem, the methodology used, the results obtained, the conclusions drawn, and difficulties encountered in the completion of the research. Following the formal presentation, which usually lasts for 20-30 minutes, the members of the committee ask questions pertaining to the validity and significance of the findings. Formal thesis defenses are usually scheduled in the month prior to graduation.

Grading

The grade assigned to the thesis report is a combination of the advisors' evaluation of the thesis process (the research process) and the thesis product (the thesis report). The grade is based on the student's entire research project, from selection and shaping of the problem through the research phase and including the submission of the final draft of the report.

The weighting of elements associated with the thesis project will vary from project to project and from advisor to advisor, but the following aspects are usually considered:

Background Study. The thoroughness with which the student researched the available relevant literature and the effectiveness with which it is discussed, evaluated, and applied.

Problem. The relative difficulty of the problem attacked, and the effectiveness with which it was shaped to manageable proportions.

Research. The validity of the assumptions made, the effectiveness with which steps in the process were planned and carried out, ingenuity shown in overcoming difficulties in the process, and suitability of the overall research effort to the problem attacked.

Interpretation. Appropriateness and validity with which the results of the research are applied to the problem defined.

Report. Effectiveness with which the report has been organized and presented to explain the problem addressed, the approach taken, the results obtained, and the conclusions reached.

Conduct of the Project. Overall professionalism with which the student carried out the project: time management, consistency of effort, appropriate use of advisor's time and expertise, and general productivity shown.

While some hours assigned to the thesis may be graded in quarters prior to the final quarter, the grade assigned during the final quarter is crucial, because it is the grade most directly associated with the thesis report.

The following grading scale has been generated as a guide to evaluating student performance on the thesis report. It is provided here as a means of indicating the criteria by which the research process and final product may be evaluated:

Factor: Grade and performance:

Initiative,   A: self-directed
Creativity,   A-: needed infrequent guidance
Independence B+: needed ongoing but minor guidance
                        B: required close supervision
                        B-: required excessive supervision

Contributions   A: ground-breaking
to Field   A-: important
                          B+: some
                          B: few
                          B-: minor

Analysis and   A: innovative
Design   A-: refinement of existing methodology
                          B+: appropriate for problem
                          B: shallow
                          B-: inappropriate for problem

Problem Difficulty	A: extreme
	A-: moderate
	B+: average
	B: minor
	B-: simplistic
Publishable Quality?	A: definitely
	A-: probably
	B+: possibly
	B: unlikely
	B-: no
Level of Effort	A: exceptional dedication
	A-: high
	B+: appropriate to task
	B: adequate
	B-: minimal
Quality of Writing	A: virtually flawless
	A-: minor, infrequent editing required
	B+: ongoing editing required
	B: significant ongoing editing required
	B-: extensive rework required
Overall Description	A: truly outstanding
	A-: clearly excellent
	B+: competent
	B: acceptable
	B-: serious limitations

These criteria are presented as guidelines for reference, not as absolute measurements to be used by all faculty members. But they do provide a useful scale for a fair evaluation of the thesis effort.

In summary, students should appreciate the fact that the thesis effort is a major part of their AFIT educational experience. If the research process is planned, managed, and executed with care and forethought, the research process and the final thesis report will prove to be a valuable part of the total AFIT program.

CHAPTER 2

Obtaining and Organizing Research Information

Collecting and Organizing Notes

Accuracy of documentation is directly linked to the researcher's accuracy in collecting and recording information. Although laptop computers and electronic databases may have replaced index cards as media for collecting and reading notes, the fundamental principle remains unchanged: bibliographic information collected from each source must be complete and accurate. The information-gathering process may be made easier if you follow a systematic method. To be effective, any system for notetaking should meet the following criteria: *usefulness, accuracy, completeness, and flexibility.*

1. It should be *useful.* It should permit the researcher to record important information from different types of sources, including books, periodicals, pamphlets, brochures, personal interviews, and any other source.

2. It should be *accurate.* The researcher should be able to record summaries, direct quotations, and paraphrases so that they can be correctly identified at a later time.

3. It should be *complete.* It should preserve complete source information, so that the researcher will not have to waste time rechecking missing page numbers, publication information, or other data.

4. It should be *flexible.* When the researcher begins to write the report, the data it contains should be capable of arrangement according to the topic headings of the outline or research diagram.

The following paragraphs describe a manual system for taking notes on cards. Used carefully, it will meet the four criteria listed above. Equally important, writers can adapt it easily to freeform electronic databases if they prefer to use their computers to store information. The manual system requires the following supplies:

--a red ball-point pen
--a blue or black ball-point pen
--a supply of 3x5 inch lined index (bibliography) cards
--a supply of 4x6 inch lined index (note) cards
--rubber bands or card files to keep cards together

The process should begin when you sit down in the library with volumes of indexes and abstracts to locate potential sources. For each potential source you identify, write a complete bibliographical entry on a 3x5 card; include call numbers as well. Use one card for each potential source. Continue to look for sources and to make bibliography cards until you have located a sufficient number of sources to meet the requirements of your project. The AFIT Style Guide contains detailed examples of correct bibliographic forms for many kinds of sources. Use these correct forms on the 3x5 cards so that you will not have to reaccomplish them later, when you construct your list of sources.

When you have completed all of your bibliography cards, you are ready to begin reading your sources and taking notes. Here are the steps:

1. Choose one of the 3x5 bibliography cards and locate the source.

    a. With the source in front of you, take a 4x6 card and the blue pen. In the upper left-hand corner of the 4x6 card, enter the author's last name and a key word from the title shown on the 3x5 card. If your source items include two or more authors with the same last name, enter the author's initials.

    b. In the upper right-hand corner of the 4x6 card, enter a key word (topic label) that describes the content of the card. If you have made an outline or research diagram in advance, the key word should match an entry in the outline or a block in the research diagram. The outline or diagram tells you what kinds of information you should be collecting for your report.

    c. Remember these key concepts: You can record data from only one source on each card and, within a source, you should start a new card every time you change key words or topics. These practices will later help you sort the 4x6 cards from all sources into separate stacks of topics you intend to write about.

2. As you read the article, you will usually take your notes in the form of summaries; that is, the facts contained in the source are recorded in your own words. Less often, you will record the exact words of the source; this is known as a direct quotation.

3. Use red ink to record direct quotations on the note cards, and use quotation marks to enclose all quoted material. The combination of red ink and quotation marks will ensure that you can identify direct quotations weeks later when you write the report. (Of course, you will not use red ink in your report.) Use blue ink to record the summaries you write in your own words.

4. At the end of item you record on a card, whether a summary or a direct quote, record the page number(s) where that material appears in the source. These specific page numbers will be included in the citations you insert in the text of your report.

When all note taking is completed, sort the note cards by key words for ease in writing the separate sections of your report. Alphabetize and number the 3x5 cards, and you are then ready to prepare your list of references that will be a part of your report's documentation system.

Some researchers prefer to make photocopies of whole articles rather than to take the time to write items of data onto their note cards. In that case, they should prepare the 3x5 cards as described above and then ensure that authors' names, article titles, and page numbers are written on each photocopy. Before writing the first draft of the report, they could use colored pens to code the passages or data according to the topics in the outline or research diagram. For example, data on "cost of widgets" in all articles could be marked in red; information on "widget design" could be marked in blue; "widget maintenance" in green, and so on. When they draft the report, writers can more easily locate source material for each topic. Although this alternative method of collecting and classifying data is less flexible than the notecard method, it is more accurate because it eliminates transcription errors when copying from the source to the card.

DTIC Documents

When transcribing data from government documents, be sure that you record pertinent identifying numbers, especially those assigned to documents by the Defense Technical Information Center (DTIC). If you gather information from a DTIC document whose number begins with any prefix other than AD-A (+ numerals) or AD (+ numerals), you should photocopy the SF Form 298 located inside that document. Prefixes other than the two just mentioned (AD-A, AD) indicate that the source document is limited in distribution. If you use material from limited distribution sources, your manuscript may also require limits on its distribution. Therefore, you should make photocopies of the SF 298 forms in the source documents in case your advisor needs to consult them when you submit your manuscript for final approval. Your advisors will want to review the material you are using from the limited distribution sources to determine the distribution status of your thesis.

CHAPTER 3

Philosophy of Documentation

This part of the <u>AFIT Style Guide</u> describes the conventions and practices of documentation that will ensure that writers meet ethical and legal obligations in the use of published material. A basic principle of documentation is that writers must give credit for all of the material they use from other sources in the course of their research, that is, all material they did not create as primary data. This documentation we call *required documentation*. Documentation that identifies useful relevant information we call *elective documentation*; we *normally document only that information we actually cite* in our reports.

Citation

Citation refers to one of several types of systems that writers use to document their sources. In some publications, the signals for citation may be footnotes, in-line notes, or end-notes. Whatever the system, the purpose of each system is to flag material for which the writer is indebted and to identify the source. The sum of all citations in a paper, together with the bibliography, is the documentation system of the paper.

Quotation

A *quotation* (also called a direct quotation) occurs when a writer is indebted to a source not only for the source's ideas or facts, but also for the wording of those ideas; that is, the words of the source are used to communicate the ideas borrowed from the source. If the writer is indebted for anything from a source—words or ideas, the writer must acknowledge indebtedness by using a citation to document it. If the indebtedness also happens to involve using the wording of the source, the writer signifies the fact by—in addition to including a citation—using either quotation marks (if the passage is shorter than four lines) or single spacing and extra indentation with no quotation marks (if the quoted passage is four lines or longer).

Paraphrase

A *paraphrase* falls into a gray area between summary and quotation. Whereas a summary uses only the source's content but not its words, a paraphrase uses the source's content stated in words and sentence structure that are similar to—but not exactly like—the source's. Because they are not convenient to use in connection with fact-based materials, paraphrases are seldom used in scientific and technical reports. If you do paraphrase, the source (and relevant page numbers) should be cited.

There is no simple answer to the problem of deciding how many words we may use from the source before we are required to show that we are quoting. A complete sentence taken from the source would certainly have to be treated as a quotation. But even a single word might have to be quoted, especially if it is a new technical word introduced or developed by the source. *As a rule of thumb, if you use three or more consecutive substantive words from the source, you should quote it as well as cite it. In general, writers should use lengthy quotation sparingly. Short quotes are preferred to long quotes, and summaries are preferred to short quotes.*

Location of Citations in Sentences

If information discussed in an entire headed section is taken from a single source, you may place the citation immediately after the heading. Normally, however, you would place it in the narrative immediately following the discussion referring to the borrowed material. You should normally place the citation at the end of a sentence or at the end of an independent clause; avoid inserting the citation into the middle of the sentence. Place the end-clause punctuation (period, comma, or semicolon) after the citation, as shown in this sample sentence from a hypothetical paper:

> According to one expert, widgets were more expensive in the third quarter of the fiscal
>
> year (Lloyd, 1986:236).

When quoting an extensive passage from the source (four lines or more), the citation follows two spaces after the period. And the quoted passage itself should be indented and single-spaced:

> According to one expert, there were several reasons why widgets were more expensive in the
>
> third quarter of the fiscal year:
>
>> Although the price of widgets had been dropping slowly during the previous nine months, the price increased slightly. The increase in price was due to increased packing costs, increased shipping costs (because the packages were larger), and a delay in production caused by a workers' strike. (Lloyd, 1986:236)

In general, place the citations in such a way that they interrupt the flow of the narrative as little as possible (**see Samples 15 and 16**).

Integrating Cited Material

It is initially difficult to avoid seeing the task of integrating cited material into your report as anything other than a "cut and paste" job. If this is your approach to including material found in your sources, your report will be choppy and disconnected, and readers will think that you are nothing more than a moderator serving to introduce a long line of guest speakers. You do not want this result. You want to blend your commentary with the ideas or comments of your sources as smoothly as possible.

One of the best ways to manage this situation is to use an appropriate lead-in phrase. Suppose, for instance, that a writer wants to begin a summary of information contained in a source. Here is a typical example:

> According to a study conducted at National Metals, contamination of alloys is a primary
>
> cause of parts failure (1:26). Investigators at National Metals tested 120 alloy samples in a
>
> six-month period and discovered that contamination was wide-spread. They concluded that
>
> "any reputable company must spend an adequate amount [of its operating budget] on quality
>
> control" (1:75). Officials at National Metals increased their budget for quality control as a
>
> result of this investigation. Stockholders in the company strongly supported management's
>
> actions (1:80). This example describes a company that followed its own advice.
>
> Another company that followed its own advice is Union Plastics. . . .

In this example, the opening phrase, "According to a study conducted at National Metals," alerts the reader to the fact that source material is entering the discussion, and the citation indicates where the information comes from. The direct quotation is followed by its own citation, which describes the factual information related to the number of tests; then two facts from the same source are presented (we assume from the same page of the source) before the next citation is given. Finally, the author draws an inference (that the company took its own advice) and transitions to the next section. This method of introducing source material should make it easy for the reader to separate original material from indebted material.

Multiple Citations

Using multiple citations eases the problem of referring to similar information contained in several sources without spending an inordinate amount of time doing so. One example of multiple citation is:

> Chi square analysis is a popular tool in data analysis (2; 4:89; 7:33).

Here, three sources are cited, the first in its entirety, and the other two with specific page numbers. This citation does not mean that the exact words were found in all three sources, but that the value of using the Chi square method was discussed and generally agreed upon by the authors cited. This method is much more efficient than writing something like

> Smith likes chi square analysis (2). So does Jones (4:89). And so does Brown (7:33).

Second-hand Sources

A *second-hand source* is a source that the writer has not seen directly but knows about because it is cited (or perhaps quoted) in a work the writer has been reading. For example, suppose you have been reading an article by Jones. Jones mentions an article by Bernelli, summarizes its contents, and provides a bibliographic citation. You would like to include Bernelli's findings in your report, but you know about them only as mentioned by Jones. Experienced scholars recommend that you put into your bibliography (and cite) only those works you have examined first-hand. There is a danger that the author you are reading (Jones, in our example) may have misread or misunderstood the article he is describing (Bernelli's article). Or he may have made an error in reporting its contents. If you repeat what Jones says without looking at Bernelli's original work, you will be repeating Jones' errors. There are two ways to deal with this situation. The first and best way is to obtain Bernelli's article. If, however, it is not possible to obtain the original, you need to make it as clear as possible that you are referring to a second-hand source, as in this example: "Another experiment, conducted by Bernelli at Johns Hopkins University and reported by Jones in <u>Scientific American</u> (3:98-100), found that . . . ." This phrasing informs the reader that the discussion is based on Jones' description, and the citation is to Jones' article; Bernelli's article does not appear in the bibliography. Even though readers might wonder why you did not obtain the original Bernelli article, they will understand you are reporting only what Jones said Bernelli said. In general, *students should be aware that the use of secondary citations is strongly discouraged.*

Copyright

A few years ago students did not have to worry about copyright infringement. The assumption was that students would not use (that is, quote) so many words of an original source that permission to reproduce those words from the copyright holder would have to be obtained. The understanding was that students would limit their quoting to "fair use" of the original. The term "fair use" was never precisely defined. Such is not the case any longer. The term *"fair use"* has usually been interpreted to mean no more than 400 words of quoted material, intended for student or private use only.

Not only has the number of words been severely limited, so has the purpose to which those words might be put. If you intend to publish a paper based on your thesis, you must obtain permission for that use. Commercially published books or articles are copyrighted by the author or publisher. Copyrighting is a method of registering ownership of words or ideas of the original authors. Currently a *copyright is good for the life of the author plus fifty years.* All countries have agreed to observe the copyright laws; art and music as well as written works may be copyrighted. Students should be aware that all computer software is copyrighted, and students undertaking projects involving the modification of commercially-produced software should obtain the owner's permission in writing before proceeding into research or developmental aspects of their project.

Not every source is copyrighted; most government documents are not copyrighted. They have been written as part of the writer's government job tasks, and the writer cannot be reimbursed or receive payment for work done as part of a government position. However, some reports published by the government may be copyrighted; these reports may have been written by a private researcher and specific permission given for limited or unlimited distribution within a specific government agency.

Restrictions to distribution will usually be indicated on the title page. Any copyrighted document should so state on the title page. If you are in doubt as to whether copyright applies, check with the appropriate Judge Advocate General (JAG) office. It never hurts to write to the author or the publisher for permission, stating exactly what portion of the document you wish to quote and what use will be made of the quoted material. If you are in doubt as to whether copyright applies, or whether you need permission to quote, obtain permission. And don't wait until the final weeks of your project, or you may find yourself rushed to obtain permission.

In summary, remember the following points:

1. Writers are required to document all material they use from borrowed sources, whether in summary or quoted form.

2. Direct quotations must be appropriately marked, independent of the requirement to document all borrowed material.

3. In professional writing, most references to borrowed material are in the form of summaries rather than direct quotes.

4. Writers should make it clear to the reader which material is original (developed by the writer) and which material is borrowed (found in the listed sources).

5. Write for permission to quote when quoting extensively from copyrighted sources.

CHAPTER 4

Documentation

Comprehensive and accurate documentation is essential to sound scholarship. As a graduate student and a professional in your field, you are already aware of the legal and ethical reasons for documenting your report carefully. This part of the Style Guide discusses a method for gathering information from your sources, and it also discusses the three primary AFIT documentation systems, the **author-year system**, the **numbered reference system**, and the **IEEE reference system**. The documentation system in a thesis or dissertation consists of two elements: **citations** embedded throughout the text and a **bibliography** (list of sources) at the end of the document.

AFIT theses and dissertations normally use one of three documentation systems: the author-year system, the numbered reference system, or the Institute of Electrical and Electronics Engineers, Inc. (IEEE) reference system. Each system refers the reader from the text to the bibliography for the identification of sources. The bibliography normally lists only those sources cited in the text. If you are especially indebted to a source, especially an individual for whom no source items are listed in the bibliography, that information is usually indicated in the preface. Regardless of the AFIT documentation system you use, you should *single-space within bibliography entries and double-space between entries*.

In AFIT citations, each item of borrowed information in the text of your manuscript is followed by a brief parenthetical reference to the source, and all sources are identified at the end of the manuscript in a bibliography or list of references. The *preferred form of citation at AFIT is the parenthetical citation system*. In years past, the footnote system of citation was used in all academic institutions, but recent practice has moved to the parenthetical system. A parenthetical system of citation indicates that the original source is referred to in the manuscript through use of parentheses, as in **(Jones, 1988:24)** (an example of the author-year parenthetical citation system), or **(4:24)** (an example of the AFIT numbered reference parenthetical citation system), or **[2:182]** (an example of the IEEE reference system).

You should note that there are many other parenthetical citation systems in use, including those preferred by the American Psychological Association (APA), the Modern Language Association (MLA), and others. AFIT students should consult their advisors to determine which parenthetical citation system should be used.

In general, writers should use that citation system which is appropriate to the subject and professional area of their thesis or dissertation topics. Thesis and dissertation advisors should be able to provide students with relevant information pertaining to the appropriate citation system.

Each professional organization issues its own documentation style guide, and students are encouraged to obtain copies for their use. Only three parenthetical citation systems are described in detail in the AFIT Style Guide, the author-year system, the numbered reference system, and the IEEE reference system.

Author-Year System

The *author-year citation system* is particularly useful in scientific studies because currency of data is important; the form of the citation provides the author's name and the date of publication at a glance. The author-year system used at AFIT is similar to the American Psychological Association (APA) system, but students should note that there are several major differences in the form of the entries, which are not discussed here.

In the *AFIT author-year system*, citations refer to sources listed in the bibliography at the end of the report. Sources in an author-year bibliography are not numbered; they are arranged alphabetically by first author's last name (**see Sample 18**). The citation includes the last name of the author, the year of publication, and the page number from which the borrowed information was taken. Thus, **(Lloyd, 1986:236)** refers the reader to page 236 of the work published by Lloyd in 1986.

These are some of the more *common variations* of the basic form:

(Lloyd, R., 1986:236) Works by two (or more) authors named Lloyd are listed in the bibliography. Reference is to the work written by R. Lloyd.

(Lloyd, 1986b:236) Two works by Lloyd published in 1986 are listed in the bibliography; one is listed as Lloyd, 1986a, and the other is listed as Lloyd, 1986b. The works are assigned their "a" and "b" listing on the basis of alphabetical order according to the titles.

(Lloyd, 1986:Ch 6, 11) Separate chapters of the source are paginated independently. Reference is to page 11 of Chapter 6.

(Lloyd, 1986:236-242) Reference is to a series of consecutive pages.

(Lloyd and Brown, 1983:236) A work by two authors; Lloyd is listed first on the title page.

(Lloyd, 1986:236; Brown, 1985:112) A reference to two sources. Multiple sources can be placed in one citation as long as the topic of discussion is reasonably narrow.

(Lloyd and others, 1987:16) A reference to a work by three or more authors. It is also acceptable to list all authors: **(Lloyd, Brown, and Smith, 1987:16)**.

(Lloyd, 1986:4-3 to 4-5) Pages are numbered by section.

(Lloyd, undated:236) A reference to a publication with no publication date indicated.

In the author-year system, *entries are alphabetized according to the last name of the author (or last name of the first author in multiple-author works).* Do not rearrange the names of the authors in multiple author works; the authors have determined the order of names among themselves and that order should be maintained. When several works by the same author are listed in the bibliography, use five hyphens followed by a period in the second and successive entries. Entries by the same author are arranged alphabetically. Entries published in the same year are arranged alphabetically according to title, and consecutive alphabetical suffixes are added to the years in individual entries (1987a, 1987b, and so on). This technique allows readers to distinguish among sources dating from the same year when they are given in the text.

Numbered Reference System

The *numbered reference system* was initially known as the Air Force parenthetical documentation system. It was in use for many years before parenthetical citation became popular in the academic world in general. The numbered reference system has its advantages and disadvantages. Its main advantage is that it results in less space required for citations. Its main disadvantage is that the reader may have to refer to the bibliography to identify the author and the currency of data. In the numbered reference system, *each source in the bibliography is given an identifying number* (see Sample 17). *Sometimes the sources are arranged and numbered in alphabetical order, and sometimes in the sequence in which they are cited in the text.* In general, *sequential numbering is preferred when writing articles, while alphabetical numbering is preferred in theses and dissertations*. The alphabetical arrangement makes it easier for the readers to use the bibliography as a reference source, while the sequential arrangement can aid the writer.

After the items in the bibliography have been numbered, appropriately numbered citations can be placed in the manuscript. The citation **(6:27)** indicates that the borrowed material is found on page 27 of the sixth source listed in the bibliography.

Here are some frequent variations of the form:

(6:27-33) Information is taken from consecutive pages 27 through 33.

(6:27, 33) Information is taken from nonconsecutive pages 27 and 33.

(6:27; 8:23-24; 9:134) Information is taken from three sources.

(6:Sec II, 42) Separate sections of the work are paged independently.

In the *numbered reference system,* entries are arranged in the bibliography in the sequence they are cited in the text, or alphabetically. The sequential order aids the reader in reading the text; the alphabetical order aids the reader in reading the bibliography. Either order requires the same amount of work from the writer. Writers considering using the numbered reference system should confer with their advisors at the earliest opportunity to determine if the advisor prefers one order over the other. Each bibliography entry begins with a number followed by a period; each subsequent line is aligned with the first letter of the first line.

IEEE Reference System

A number of engineering advisors prefer the use of the IEEE system for thesis and dissertation documentation, as described in Information for IEEE Transactions and Journal Authors. This documentation system is intended primarily for article publication, however, and sometimes may not accommodate the special documentation tasks required of theses and dissertations. All IEEE journals provide style guidance for authors on the back pages of the individual journals. Students should note that *style guidance can vary from journal to journal; there is no set style which applies to all IEEE publications*. Students should also be aware that the generally preferred IEEE referencing system is to use brackets [] instead of parentheses () and to cite the article without reference to page number unless a specific quotation is taken from the article.

This practice, while appropriate for the submission of articles for publication in journals, often is not sufficient for AFIT theses and dissertations. Students should discuss this matter with their advisors.

Here are two forms of the IEEE system:

[2] This reference indicates the author is referring to a discussion of a source document in its entirety, rather than to a single page in that document. This method is suitable when the source document is a relatively short work and discusses a limited topic.

[2:122-23] This reference indicates specific pages of the source document. This kind of reference is appropriate for longer source documents or when specific facts, ideas, quotations, or equations are mentioned in the thesis or dissertation.

Bibliographies

The *bibliography* is a term for the list of sources, included at the end of a report, for all items cited in the body of the report. The bibliography provides complete bibliographic information (author, title, publication data) to readers interested in identifying, and possibly obtaining, the sources.

The following paragraphs illustrate the format of bibliographic sources used in AFIT papers, theses, or dissertations. They are examples of the format used in connection with the three AFIT documentation systems described in the AFIT Style Guide (the author-year system, the numbered reference system, and the IEEE reference system). If you are going to be using a documentation system other than those described in this Style Guide, you will want to obtain the most recent style guides published by the appropriate professional organization. You will want to ensure that you have coordinated with your advisor prior to compiling your bibliography to ensure that you are using an acceptable and appropriate documentation system for your area of academic specialization.

In the following examples, the *basic entry* is described. The form of the entry would be modified slightly to add the reference number in the case of bibliographies constructed to accompany the numbered reference system or the IEEE reference system. For instance, if the basic form looks like this in the example,

> Maybeck, Peter S. Stochastic Models, Estimating, and Control. New York: Academic
> Press, 1988.

it would appear in this form in the numbered or IEEE reference system:

> 15. Maybeck, Peter S. Stochastic Models, Estimating, and Control. New York:
> Academic Press, 1988.

Books

The bibliographic entry for a book is divided into *three sections*, each separated from the other by a period: *Author. Title. Publication data*. Publication data include the city of publication (and the state or country of publication if the city is not well known), the name of the publisher, and the year of publication. *Military or civilian titles of authors are normally not included in bibliographies, nor are the names of the institutions for which they work.* When several cities are given, use the first city listed. When several different dates are given on the title or copyright page, the most recent date should be used. Here are some commonly used forms:

[Simple entry:]

> Maybeck, Peter S. Stochastic Models, Estimating, and Control. New York: Academic Press, 1988.

[Second entry, same author:]

> -----. Stochastic Models for Compressed Data Input. New York: Computer Services Press, 1990.

Note: Multiple sources by the same author are arranged alphabetically by title.

[Two authors:]

> D'Azzo, John J. and Constantine H. Houpis. Linear Control Systems Analysis and Design. New York: McGraw-Hill Book Company, 1989.

[Three or more authors:]

> Martin, John L. and others. The Old Ethics and the New Military. Boston: The High Times Press, 1991.

Note: It is also permissible to include the names of all authors instead of saying "and others."

[Later edition:]

> Crouch, George W. and Robert L. Zetler. A Guide to Technical Writing (Second Edition). New York: The Ronald Press Company, 1954.

Note: Later editions often contain much new or revised material. The term "second printing" technically means a second printing of the book using the original plates, with no new material added. Some publishing houses are inconsistent in their use of this term.

[Essay in a collection of essays:]

> Emmelhainz, Larry M. "Total Quality Management in Air Force Logistics Planning," in Total Quality Management in the Department of Defense. Ed. Wayne Stone. Alexandria VA: The Freedom Press, 1990.

Note: The state is included (in Post Office abbreviated form) because the city of publication might not be easily recognized. This form is used when chapters are authored by different individuals.

Periodicals

A *periodical* is defined as any professional journal, magazine, newspaper, newsletter, pamphlet, booklet, brochure, or any other form of publication that is published in regular intervals in a numbered series. The *volume number and date of the issue in which cited material appears should be specified.*

[Simple entry:]

>   Church, David K. "The Image of the Engineer in the Popular Imagination, 1880-1980," Bulletin of Science, Technology Society, 10: 301-304 (December 1990).

Note: In the above entry, the numbers 301-304 refer to the inclusive page numbers on which the article is found.

[Two authors:]

>   Jannerone, August G. and Ray E. Stratton. "Trouble in Costa Mesa: An Airpower Case Study in Peacetime Engagement," The DISAM Journal, 14: 99-108 (Winter 1991-92).

[Three or more authors:]

>   Thomas, Margaret, Gloria Jaffe, J. Peter Kincaid, and Yvette Stees. "Learning to Use Simplified English: A Preliminary Study," Technical Communication, 39: 69-73 (February 1992).

Note: It is acceptable to use "Thomas, Margaret, and others."

[Newspaper article:]

>   Wilson, Arthur. "The New Europe and National Defense," The Dayton Daily News, 23 March 1992, sec. A:2.

>   Van Sant, Bradley. "The Leaner, Meaner Air Force," The Air Force Times, 15 February 1991: 6.

[Unsigned article:]

>   "View from the Top, The," Quarterly Review of Economics, 22: 53-55 (Summer 1982).

Note: This unsigned (no author given) source should be alphabetized among the Vs. Articles like **the** or **a** may be moved to end of the title, or they may keep their original location, as long as there is standardization within the bibliography. In the author-year system of documentation, the citation in the text would use the first few words of the title.

Government Publications

To the extent possible, bibliographic entries for government publications should resemble those of books: Author. Title. Publication Information. Because most government publications are not attributable to a single author (or to any identified authors), the issuing component or agency is usually listed as the author. Descriptive numbers or phrases (such as document numbers, series numbers, or contract numbers) should be included. *As with books, the title of the publication is underlined.*

[Report:]

> Bureau of the Census. Population Estimates and Projections. Report Series P-25; No. 108. Washington: Government Printing Office, 1980.

Note: "Government Printing Office" is usually abbreviated as GPO.

[Regulation:]

> Department of the Air Force. Communications: Air Force Standard Functional Address System. AFR 10-6. Washington: HQ USAF, 22 January 1982.

[Manual:]

> Department of the Air Force. USAF Formal Schools Catalogue. AFM 50-5. Washington: HQ USAF, 1 June 1980.

[Directive:]

> Department of Defense. Distribution Statements of Technical Documents. DOD Directive 5200.20. Washington: GPO, 26 March 1971.

[Law:]

> United States Congress. National Security Act of 1979. Public Law No. 193, 96th Congress, 1st Session. Washington: GPO, 1979.

[Hearing:]

> Judicial Committee on Monopolies. Hearings of Restoring Effective Enforcement of Antitrust Laws. Hearing, 96th Congress, 2nd Session, 1979. Washington: GPO, 1979.

Independent Publications

This diverse group *includes all publications except books, periodicals, and government publications.* It includes manuals, brochures, pamphlets, conference proceedings, dissertations, theses, and other forms of published data. *As nearly as possible, the information listed in an entry should resemble that provided for books.* Because each publication is produced to meet the needs of the sponsoring organization, many unique documentation signals may appear on the title page or elsewhere, including company names, contract numbers, revision dates, division names, and committee names. The bibliographic entry should include enough of this peripheral information to enable readers to evaluate the worth of the document and to obtain it if they wish to do so.

[Thesis:]

Carpenter, Dennis M. Relating Expected Inventory Backorders of Safety Stock Investment Levels. MS thesis, AFIT/GIM/LSM/86S-15. School of Systems and Logistics, Air Force Institute of Technology (AU), Wright-Patterson AFB OH, September 1981 (AD-A1103970).

[Dissertation (AFIT):]

Neumann, David W. Observation and Analysis of LiCa and MiMg Excimers. Air Force Institute of Technology (AU), Wright-Patterson AFB OH, June 1980 (AD-A1113137)(ON7229905).

Note: Both DTIC and University Microfilms order numbers are included in AFIT dissertations.

[Dissertation (non-AFIT):]

Miro, Donald J. A Comparative Evaluation of Relaxation Training Strategies Using EMG Biofeedback. Ph.D. dissertation. Loyola University of Chicago, Chicago IL, 1981 (ON8119983).

Note: The University Microfilms order number is included as a convenience to the reader.

[Conference paper:]

DeWispelare, Aaron R. "Algorithm Efficiency in Generating Non- denominated Solution Sets," Proceedings of the IEEE 12th Annual Symposium in Systems Theory. 218-222. New York: IEEE Press, 1980.

[Research report:]

Blair, Morton F. and Milburn J. Werle. The Influence of Free-stream Turbulence in the Zero Pressure Gradient Fully Turbulent Boundary Layer: Interim Report, 1 June 1982-1 June 1983. Contract F49620- 78-C-00064. East Hartford CT: Adkins Research Center, September 1983 (AD-A1913094).

[Company brochure:]

Dynocanque Task Group. Procedure for Retrofit of the Dynocanque II. Dealer Maintenance Bulletin 8-48. Philadelphia: Engineering Department, Hodges Manufacturing Company, July 1982.

Honing Supplies. Product Catalog X-SP-50502. St. Louis: Sunnen Products Company, no date [1982].

Note: Information in brackets indicates information not found in the document itself but obtained elsewhere. In the example above, the author has learned from communicating with company personnel that the catalog was printed in 1982.

Unpublished Sources

Unpublished sources are sometimes used for information not available through usual channels. The source may be an individual or an agency in industry, government, the academic world, or elsewhere. While the material may be available in printed form, it is not "published" in the usual sense of the word, and it may not be easily available to those who might wish to obtain it. While the form of bibliographic entry may vary, the reader should be given sufficient information to evaluate the quality of the source and to be given a reasonable chance of obtaining it. The *information you provide about these sources should match as nearly as possible the information provided for published sources*: author, title (if any), description of the material, name and location of the originating organization or agency, and the date of issuance. Because the source is not a published work, the position or title of the author is often included to indicate the person's authority in the subject area.

[Speech:]

> Antonellis, Kevin B., Assistant Secretary of State, Middle East. "A Riddle Wrapped in an Enigma [Analysis of the Current Middle East Situation]." Address to Air Force Institute of Technology students and faculty. Air Force Institute of Technology, Wright-Patterson AFB OH 8 January 1985.

[Class lectures or handouts:]

> Dean, William A. Class handout, SYS 228, Basic Configuration Management. School of Systems and Logistics, Air Force Institute of Technology, Wright-Patterson AFB OH, July 1986.

Note: Instead of the month ("July 1986"), the quarter ("Summer Quarter 1986") may be listed.

[Correspondence:]

> Murray, Doris. President, Telemetrodynamics Corporation, Long Beach CA. Personal Correspondence. 1 April 1991.

[Electronic message:]

> HQ USAFE. "Advanced Contract Administration and Contract Law Site." Electronic Message. 151500Z, 20 May 1988.

[Telephone interview:]

> Smith, C. Ross. Vice-President for Sales, Telemetrodynamics Corporation, Long Beach CA. Telephone interview. 9 April 1991.

[Personal interview:]

> May, Marian C. Vice-President for Manufacturing,Telemetrodynamics Corporation, Long Beach CA. Personal interview. 10 May 1991.

> Elrod, William B. Chief, B-1 Electronic Equipment Branch, Air Force Materiel Command, Wright-Patterson AFB OH. Personal Interview. 8-9 July 1990.

[Memorandum:]

> Aeronautical Systems Division, Air Force Materiel Command. Memorandum of Agreement with Air Force Contract Maintenance Center. Wright-Patterson AFB OH 18 September 1989.

[Contract:]

> Aeronautical Systems Division, Air Force Materiel Command. Contract F36980-81C-0396 with Northrup Corporation. Wright-Patterson AFB OH, 12 October 1990.

[Report (unpublished):]

> McNichols, Charles W. and Roger T. Manly. "Quality of Life in the United States Air Force: A Quick Look Report." Report to DCS/Personnel, HQ USAF, Washington DC. June 1988.

> Franke, Milton P. "The Effects of High Altitude Ablation on Air Force Readiness." Unpublished Report No. 4328. Air War College, Maxwell AFB AL, 1983.

> Wyte, Lois E., Director of Production Engineering. "Schedule for 1989 Changeover in Assembly Plants." Report to Directors of GMC automotive divisions. Fisher Body Division, General Motors Corporation, Warren MI, 8 July 1988.

[Television program:]

> Wall Street Week. Prod. Louis Rukeyser. Public Broadcasting System. WDPR-TV, Dayton OH. 30 September 1990.

[Radio program:]

> All Things Considered. Prod. Noah Adams. National Public Radio. WGUC, Cincinnati OH. 2 February 1992.

[Computer software:]

> Readability Plus. Version 1.0, IBM, 512k, disk. Computer software. Scandinavian PC Systems, Rockville MD, 1990.

[CD-ROM:]

> "Qualitative Research." A Guide to Research Methods. Version 2.0. CD-ROM. New York: Sage Publishers, 1997.

Note: If you are citing an article published in another source but found on a CD-ROM, list the original source first in standard bibliographic format, then add the information about the CD-ROM.

World Wide Web and Similar Electronic Databases

The World Wide Web is quickly becoming a major source of ideas and information for researchers. Although a great deal of information may be found on the Web, students should realize that information obtained on the Web is ephemeral. That is, the information may be impermanent, tentative, and subject to change practically on a daily basis. Information found on

the Web may not be traceable in the same manner that an article or book will be. Therefore, you should be cautious about including information found on the Web. The Web can provide good ideas for creative thinking and problem solving, but the information found on the Web will frequently change. If you do use information found on the Web, however, you should cite it in the same fashion as any other source, with a few minor modifications.

The entry should begin with the author's name (if known), the title of the article or document, any information that will identify the location of the information in the electronic text, and the Web address as completely as you can give it. You should also state the nature of the document (article, essay, excerpt from book, chat room discussion, and so on). Conclude with the date you found the information. The following is an example of a bibliographical entry for information found on the Web:.

> Jones, William. "Some Thoughts on User Reliability." Excerpt from unpublished article, n. pag. WWWeb, hhtp://www.dtic.dla.mil/defenselink. 20 March 1997.

The appropriate citation would be (Jones, 1996) (author-year system) or (26) (numbered reference system). There would be no page number shown because no page numbers were indicated in the electronic document. The abbreviation n. pag. (for not paginated) in the bibliographic entry indicates a lack of page numbers, which is usually the case with information published on the Web. Follow the same format for similar items found on the internet or other electronic sources. Be consistent throughout your document, both in citations and bibliographic entries.

Anonymous Sources

When no author is given, the entry is placed in *alphabetical order by the first main word in the title* (the articles a, an, and the are not used for alphabetization purposes). Each entry begins on the left margin, and successive lines of the entry are indented five spaces.

DO NOT use five hyphens to indicate an anonymous source; alphabetize the entry according to its title (or agency, in the case of government or corporate publications).

Classified Sources

In an unclassified thesis or dissertation intended for open publication, no reference is to be made to classified reports. Even unclassified sections of classified reports are not to be cited or used in unclassified theses or dissertations. If you believe this restriction would impair the integrity of your report, you and your advisor should discuss the matter with the controlling authority in your school.

Style Guidelines: Other Resources

The following sources should be consulted for information pertaining to other documentation and bibliographic systems. No dates are given; users will want to obtain the latest editions.

> American Chemical Society. American Chemical Society Style Guide and Handbook. Washington.

American Institute of Physics. Publications Board. <u>Style Manual for Guidance in the Preparation of Papers</u>. New York.

American Mathematical Society. <u>A Manual for Authors of Mathematical Papers</u>. Providence RI.

American Psychological Association. <u>Publication Manual of the American Psychological Association</u>. Washington.

Associated Press. <u>The Associated Press Stylebook</u>. Dayton OH: Lorenz Press.

<u>The Chicago Manual of Style</u>. Chicago: University of Chicago Press.

Council of Biology Editors. Style Manual Committee. <u>CBE Style Manual: A Guide for Authors, Editors, and Publishers in the Biological Sciences</u>. Bethesda MD.

Gelfand, Harold and Charles J. Walker. <u>Mastering APA Style: Student's Workbook and Training Guide</u>. Washington: American Psychological Association.

<u>Harvard Law Review: A Uniform System of Citation</u>. Cambridge MA.

Hodges, John C., and others. <u>Harbrace College Handbook</u>. New York: Harcourt Brace Jovanovich.

Modern Language Association. <u>The MLA Style Guide</u>. New York.

Turabian, Kate L. <u>A Manual for Writers of Term Papers, Theses, and Dissertations</u>. Chicago: University of Chicago Press.

United States. Government Printing Office. <u>GPO Style Manual</u>. Washington.

In addition, most professional journals contain style guidelines which editors of those journals require potential authors to follow in preparing articles for publication. A few representative journals are indicated below:

<u>The Academy of Management Journal</u>

<u>The Academy of Management Review</u>

Both of these publications include their "Style Guide for Authors" in the first number of each volume.

<u>The Journal of Technical Writing and Communication</u>

<u>Technical Communication Quarterly</u>

These publications include their style guidelines on the back cover or on a page close to the back cover of each issue. The documentation practices of these journals are similar to those found in <u>The MLA Style Manual</u>.

CHAPTER 5

Format

When we talk of format as it pertains to AFIT theses and dissertations, we are talking about several aspects: the appearance of the text, the sequence of the information presented, the visual aids included in the text, and other non-textual characteristics like equations and numerical representations. A standardized format ensures that all AFIT theses and dissertations are more or less alike, and it ensures ease of reader comprehension of the material presented in them. *Any format feature which aids the reader is helpful; any format feature which confuses the reader is not helpful.*

Appearance

Throughout the final copy, text and illustrations are to appear on *one side of the paper only*. Final copies of theses and dissertations must be prepared on 8½ by 11 inch white, unlined, good quality bond paper. The typeface must be uniform throughout the text. The text must be uniformly dark. The *final copy must be error-free*. For **EN students,** one copy of the thesis should be printed on 25% rag (one copy of a Ph.D. dissertation should be on 100% rag) and all other copies may be on regular bond copy paper.

Underlines and Italics

All titles of books or periodicals should be underlined or italicized. In addition, all foreign words or phrases or all non-standard words or phrases should be underlined or italicized. Do not place words in quotation marks unless you are quoting from a source. Because most printers and word processing systems now can show both italicized and underlined words, *be consistent* in your practice throughout your document. On printers that cannot produce italic fonts, underlines are used to represent italics. If you will be using a printer that produces true italic type (not script), you may use that font in place of underlined text. However, *be sure you are not using both italic and underlining fonts in the same document*. Underlines must be solid within words. Underlines may be solid or broken between words, but be consistent. Boldface print may be used as long as the resulting quality of print is clear.

Computer Printed Copy

Computer printers may be used to produce the final copy. However, the printer must produce letters that appear to be fully formed and composed of lines of uniform darkness. The following are **not** acceptable:

* Dot matrix output in which dots are clearly discernible;

* Letters on which descenders (like the bottoms of the letters **q** or **y**) are omitted or squeezed up into the text line;

* Fonts in which there is no clear distinction between upper and lower case letters;

* Printers that do not produce all standard punctuation marks;

* Printers whose underlining cuts through or overstrikes descenders in a way that makes the letter difficult to read;

* Printers that justify the right margin by leaving unequal amounts of white space between letters or words. In general, ragged (unjustified) right margin is preferred.

You must ensure that your printer can produce all the necessary signs and symbols, and that it provides the variable spacing necessary for superscripts and subscripts.

Type must be crisp, clear, and easily readable. The pages of your thesis or dissertation will be stored on microfiche by DTIC and will be *reproduced on DTIC copies at 75 to 80 percent of the original size.* The *appearance and the content of the final document must be acceptable to both the advisor and the school.* If you have questions about the suitability of the print you intend to use in the final copy, obtain advance approval from the appropriate offices. See **Sample 27** for examples of type faces and sizes.

Margins and Spacing

The side (left and right) and bottom margins must provide 1¼ inches of white space, and the top margin must provide 1 inch. These measurements apply to **all** pages in the document, including those containing visual aids and all items placed in the appendices. Keep these specifications in mind, especially when formatting your tables, figures, and computer printouts.

All text should be **double spaced except for:**
* *Lists and tabulations, including bibliographies.* Double space between items in a list and single space between lines in each item. This spacing must be used in bibliographies and other lists with short (two or three line) entries. When items in a list are essentially part of the running text, single spacing is not required.

* *Quotations more than three typed lines long*. Indent the left margin of long quotations at least five spaces from the normal left margin. If the first sentence of a long quotation begins a paragraph in the original source, you may indent the beginning of that sentence an additional five spaces (Note: this extra indentation is optional). You may also indent the right side of the quotation five spaces (Note: this additional indentation is also optional). Do not use quotation marks to enclose these long, single-spaced quotations. Note that the citation follows the period of the final sentence of a long quotation. Single space long, indented quotations.

Headings and Subheadings

Rankings of headings should be distinguished by their appearance or placement on the page (**see Samples 12, 15, and 16**). The five levels of headings and their appearance are described below. Few theses or dissertations will require more than four levels of headings. *All headings (except for the first level—the title) will be repeated in the table of contents.*

The *first level of heading is the report title*; in this case it is the title of the thesis or the dissertation. The title should be *short, concise and general*. The place for qualifying conditions, methods, etc. belongs in the abstract, not in the title. Critically inspect the modifiers and modifying phrases in your title and eliminate all that you can. The title of the report appears on the flyleaf, on the title page, and at the top of the first page of Chapter 1. In all three cases, it is written in full capitals and centered horizontally. On the first page of Chapter 1, the title is placed three vertical lines below the normal one-inch top margin (**see Sample 12**). If necessary, the title can be divided into two (or more) lines. The first main heading for Chapter 1 is placed four vertical lines below the last line of the report title.

The *second level of heading is the main heading (the chapter title)*. Main headings are used for each main section of the document: each chapter, each portion of the appendix, and the bibliography. The main headings are centered 1¼ inch below the top of the page (except for Chapter 1, as noted above). *Individual words in the main heading are underlined or italicized.* The first letter of the first word is capitalized, as are all other words except articles (a, an, the), short prepositions, and short conjunctions. The narrative of the chapter begins three spaces below the last line of the main heading (chapter title). Titles of individual papers should be formatted as main headings.

The *third level of heading is the subheading.* This level of heading is the kind of heading we usually think of when we think of headings inserted into the body of the report. Subheadings begin flush with the left margin. They are normally underlined or italicized, though bold print can be used if the contrast is clearly noticeable. Subheadings are preceded by a triple horizontal space and followed by a double horizontal space. The first letter of the heading is capitalized, as are all other main words, as in main headings. *Periods are not placed after subheadings.*

The *fourth level of heading is the sub-subheading. Sub-subheadings are indented five spaces, underlined, italicized, or emboldened, and followed by a period.* The text follows immediately after the sub-subheading, on the same line, but allowing for the two spaces that normally follow a period (**see Samples 15 and 16**). Capitalize as in main headings and subheadings.

The *fifth level of heading is the sub-sub-subheading.* This level of heading is indented 10 spaces. The format and capitalization are the same as for sub-subheadings.

"Widows and Orphans"

Be careful not to create what are called "widows" and "orphans" in your text. A "widowed" line occurs when only one line of text in a new paragraph is placed as the last line on a page, or when a heading is placed at the bottom of a page with no text beneath it. An "orphaned" line occurs when the top of a page contains only one line of text. *Move your text as necessary to avoid these isolated lines of text.*

Page Numbering

Number all prefatory pages except the flyleaf and title page (and approval page in dissertations) in lower-case Roman numerals. The title page (and approval page in dissertations) is counted as a page even though it does not carry a number. Thus the first physically numbered page in a thesis is the preface. It is numbered as page ii (page iii in dissertations). You can number the main body of the document (the text and supplementary material) in *one of two ways*--sequentially straight through the document or sequentially within sections of the document. The method you choose should be reflected in the system with which you number figures and tables.

The sequential "straight-through-the-text" method uses a single series of Arabic numbers beginning with the first page of the introduction and continuing through the text, appendices, bibliography, and vita. Sequential numbering makes it easier to fill out the SF Form 298, which requires a total page count.

The sequential "within sections" method numbers chapters, individual appendices, the bibliography, and the vita with identifying prefixes and sequential numbers. For example, the first three pages of Chapter 2 would be numbered 2.1, 2.2, 2.3 or 2-1, 2-2, 2-3. Pages of Appendix C would be numbered C.1, C.2, C.3 or C-1, C-2, C-3. The pages of the bibliography would be numbered BIB.1, BIB.2, BIB. 3 or BIB-1, BIB-2, BIB-3. Center the page numbers (Roman and Arabic) in the bottom margin about ¾ inch from the bottom of the paper.

CHAPTER 6

Visual Aids

Visual aids are self-contained visual images designed to supplement the reader's understanding of textual material. Any material not in narrative form can be considered to be a visual aid. The specific form of the visual aid is less important than its coherence, effectiveness, and appropriateness. However, to be fully effective, a visual aid should be planned and prepared with the same care as if it were part of the textual material.

Traditionally, visual aids have been grouped into two kinds: tables and figures. There are a number of distinguishing features associated with tables and figures, and the distinctions between them should be understood clearly. Basically, a **table** consists of data arranged in columns and rows. A **figure** is any visual aid that is not a table. Figures typically include illustrations, graphs, schematic diagrams, photographs, and flow charts. Tables and figures are identified separately in the text and in the prefatory pages. The primary reason for distinguishing between tables and figures is that tables are statistical summaries of data, while figures are visual representations of things or concepts.

Tables

Tables are a convenient means for presenting quantities of data for easy review and comparison. When designing tables, place the independent variables in the left column (the y axis) and the dependent variables from left to right along the bottom of the graph (the x axis). Separate the columns of tables by lines or by white space. Each column should have a heading, written horizontally if possible. Units (such as dollars, pounds, meters) are listed in the column heading rather than in the columns, unless the columns contain mixed units. In numerical tables, align items on the decimal point unless they represent different values (like dollars, marks, and francs).

Center table numbers and titles **above** the table (**see Sample 14**). Citations to acknowledge indebtedness for information provided in tables may be included immediately after the table title, or they may be placed beneath the table, flushright with the table's edge.

Figures

A figure may be prepared in any manner, as long as the result is a clear, unsmudged design capable of easy reproduction in the reprinting process. You may submit original drawings or designs in black reproducible ink, or you may submit high contrast photocopies in place of originals. To be suitable for microfilming, photocopies must be clear, sharply defined, and free

of gray background shading. Figure numbers and titles are centered **below** the figures (**see Sample 13**). Citations to acknowledge indebtedness for material contained in figures may be included in the figure title, or they may be placed beneath the figure, flushright with the figure's edge.

Graphs are a type of figure useful for displaying values of continuous data. In AFIT texts, close grids are not used on graphs unless the accuracy of the plotting warrants them. For theoretical curves whose purpose is to indicate a trend, wide grids or tick marks drawn on plain white paper are preferred. Be careful about using graph paper containing blue grids, because the color blue does not reproduce well. Orange or green grids are preferred. The lines of the curves drawn on the grid should be wider than the grid lines themselves to ensure clear definition on reproduced copies. Any print placed within the area covered by the grid lines should be prepared on white paper, trimmed to a rectangular shape of appropriate size, and mounted on the graph paper with rubber cement. White gummed labels may also be used. The white paper should be trimmed to allow at least 1/8 inch border around the area of the typing.

Charts are useful for displaying values of discrete data. Bar charts (either vertical or horizontal) and pie charts have the advantage of being relatively easy to design. Pictographs and other types of charts are also effective ways to present data.

All *photographs* used in the original copy of the thesis or dissertation as well as additional copies submitted with the original copy must be glossy prints. High contrast black and white prints are preferred. Electrostatic copies are not acceptable. Graphics normally cannot incorporate color, because colors will not reproduce in photocopies or microfiche form. Differences in shading, texture, or line design must be used to distinguish among different variables in the same graphic. Be sure to order a sufficient number of prints of required photographs when submitting work orders to the base photo lab. The prints should be cropped and indexed, if necessary, to show the desired features. Prints should be mounted with rubber cement on white paper of the appropriate quality.

To minimize initial and later reproduction costs, only those photographs that are essential to understanding the content of the document should be included. Required photographic services, including enlargements and reductions of photographs, can be obtained from the base photo laboratory. Negatives should contain high contrast between light and dark areas to ensure good definition of the prints. Pages containing photographs should be numbered in the same way as other pages, and normal margin widths must be maintained. In some cases, you may be asked to give the negatives of all photographs appearing in the thesis or dissertation to the thesis advisor along with the final draft.

All typing or printing on a page should be completed and all labeling added to a photograph before it is mounted on a page. Screened prints may be used in place of glossy prints when the definition on screened prints is sufficiently sharp for the purpose of the illustration. In such cases, it will not be necessary to submit negatives.

Computer Printouts

Use only as many pages of computer printouts as are required to present essential numerical data or programs containing unique features. Do not include computer programs that perform routine calculations, and do not make extensive listings of raw data files, particularly when you can present such data more meaningfully in other graphics. In general, computer source listings should not be included in the body or as an appendix. Computer printouts must meet the paper and margin requirements specified for pages of the text. As on other pages, the print quality must be uniformly dark, cleanly defined, and suitable for microfilming. Because computer files can be transferred through the AFIT local area network system to letter quality printers, there is no reason for poor quality output.

If the student and advisor agree that research-related computer printouts or computer programs are valuable enough to be retained, a note indicating their availability may be included in the thesis or dissertation, and these items will then be included in the department copy for subsequent reference.

Foldouts

Avoid the use of foldouts in theses and dissertations, because their large size complicates the document reproduction process, and they deteriorate more quickly than standard size pages. Foldouts will be filmed as separate pages by both University Microfilms and DTIC. Thus, an 11 x 17 inch foldout will appear as two consecutive pages, and only the first page will be numbered. If a figure or table is too large to fit on an 8 ½ x 11 inch page, consider having the base printing plant or photo lab reduce it, or consider designing it across several pages with connecting points to guide the reader in interpreting it.

If foldouts must be used, they may extend to a maximum width of 35 inches, and they may be folded from one to four times. For ease of reference, foldouts are usually placed in an appendix. The maximum size reproduced by the base printing plant is 11 x 17 inches. Any larger foldouts will be sent to off-base printers; orders for such foldouts must be placed with the base printing office from six to eight weeks in advance of the date on which the final copy of the thesis or dissertation is due, and sufficient copies must be ordered to meet distribution requirements.

Reduction and Enlargement

The base printing plant can enlarge or reduce material as required. In addition, most photocopiers can enlarge or reduce copies as well. When material is to be enlarged or reduced to appear as a full-page figure or table (6 x 8¾ inch image area), be careful to maintain a 2:3 proportion of width to height. Examine the size of typing or printing on the original to ensure that the finished product will be legible and suitable for microfiche reproduction after the page has been enlarged or reduced. Pages copied from DTIC microfiche will be between 70 and 85 percent of the original page size.

Incorporating Graphics into the Text

All figures and tables must be cleanly presented and suitable for electrostatic reproduction, microfilming, and reproduction from microfiche. Some cutting and pasting is usually necessary in preparing graphics. Rubber cement, not glue, should be used for mounting graphics. In some cases, a photocopy of the graphic may be substituted in place of the original. No shadow lines or corrections should be visible on copies made in this fashion.

Margin requirements for pages containing figures or tables are the same as those for all other pages of text: one inch at the top and one and one-quarter inches on all other margins. Leave three blank lines above and below tables and figures that are adjacent to text in the document in order to provide obvious visual separation from the text. You may *box* (draw lines around) figures and tables to provide additional visual separation from the text. If you use boxes, place titles outside the boxes. *Remember that titles are placed below a figure and above a table* (see **Samples 13 and 14**).

The *title for a figure or table* must be sufficiently complete that it accurately describes the content of the graphic. The graphic and its title should be sufficiently self-contained that if they were extracted from the document, the reader could still understand the purpose and the content of the graphic.

Thus, titles like "Variables" are inadequate; titles like "Values of Variables Used in Experiment Two" are better. Titles are not complete sentences. Use special care in *numbering tables and figures*. Figures are usually numbered in a consecutive series of Arabic numerals beginning with the first figure in the text and continuing throughout the document, including supplementary material.

In the title, either the word "Figure" or the abbreviation "Fig." is acceptable; but *be consistent.* **In the text,** most advisors prefer the use of the word rather than the abbreviation. In the text, the words "figure" and "table" are capitalized when they are used with a number in reference to a specific graphic (for instance, "Figure 3 displays the distribution of the data points").

Use Arabic numerals for tables and figures. Tables and figures are numbered in separate series, so that if you have one table and one figure in your text, you would have Figure 1 and Table 1. One common way to number either tables or figures is to begin with the first of each type that appears in the text and assign successively higher numbers to others that appear throughout the text and in appendices. An alternative to this "straight through the document" method is a system that numbers graphics in separate series within each section of the document. This system uses an identifying section prefix and a sequential number within the section: the title "Table 3.1" identifies the first table in Chapter 3. **NOTE:** use this method only if you use the equivalent method of page numbering. If page numbers are "straight through the document," graphics should be numbered "straight through the document"; if page numbers are linked to individual chapters, graphic numbers should be linked to chapters. *Do not mix numbering systems.*

Do not insert a graphic into the text until you have mentioned it in the text. The wording of the text should prepare the reader for the appearance of the graphic by introducing it. Place the graphic in the text as soon as it will conveniently fit in the available space. If there is room on the page after it is mentioned in the text, insert it on the same page. But be sure to leave adequate room for spacing the graphic.

If there is not adequate room on the same page, place it at the top of the following page. In such cases, the text of the page on which the graphic is introduced continues to the bottom of the page; do not leave extra white space at the bottom of the page. Regardless of their actual width (up to the maximum of 6 inches), graphics should be treated as if they occupied the full width of the page. Center the graphic between the left and right margins. No narrow column of text should be placed beside a graphic. Tables and figures that are too wide to fit on the page in their normal orientation may be rotated 90 degrees counterclockwise to the right (non-bound) edge of the page. Thus, for figures, the title is located parallel to the right margin, centered beneath the figure. For tables, the title is parallel to the left margin, centered above the table. Normal margin widths must be maintained.

Equations

Many AFIT theses and dissertations contain mathematical equations or formulae. There are a number of conventions to be followed in displaying equations or formulae. Equations may be typewritten, written by hand, or printed on suitable computer printers. However, the mode of presentation of equations must be consistent throughout the document. Computer-generated or typed equations are preferred to hand-lettered equations. Permanent transfer symbols (such as Press-Type) may be used in typed equations if necessary. If transfer symbols are used, they must be firmly affixed, and the completed page must be clean.

If handwritten, equations should be lettered in India ink or other easily reproducible black ink. A lettering guide should be used to make handwritten equations, and special care is required to ensure that the reader can easily distinguish between upper and lower case letters and between Greek or mathematical symbols and letters of the alphabet.

Simple, short equations or formulae which are not critical to the development of main ideas in the text and which will be mentioned only once are placed in the text on the lines in which they occur. These "in text" equations are both preceded and followed by a double space. If punctuation follows the equation, it is placed after the double space. For example, a simple "in text" equation would appear as $F = ma$. Characters in the equation may be italicized. Equations placed in the text in this fashion are not numbered.

More often, equations are formally "displayed" rather than being placed "in text." Displayed equations are centered on the page, numbered, and their symbols are defined. Equations are identified by the number originally applied to them in their first appearance in the text. An appropriate amount of spacing is provided above and below the equation, and the terms are usually italicized. This is an example of a "displayed" equation:

$$F=ma \qquad (1)$$

where F is force, m is mass, and a is acceleration.

Alternately, the terms may be defined in a list below the equation:

$$F=ma \qquad (1)$$

where

F = Force (Newton's)

m = mass (kg)

$\underline{a} = \underline{\text{acceleration}}$ (m/sec/sec)

A series of equations should be aligned on the equal signs wherever possible:

$$\underline{E} = \underline{IR} \qquad\qquad (2)$$

$$26XY - 12 = 14(X + Y) \qquad (3)$$

A long equation is begun at or near the left margin, broken before an operational sign, an arrow, or an equal sign, and ended near the right margin, leaving room for the equation number.

If a statement introducing an equation is a complete independent clause, it is followed by a colon. Otherwise, no punctuation is used after the introductory element. And even though an equation ends a sentence or other complete grammatical structure, no punctuation is placed after a displayed equation.

A displayed equation should be set apart from the text by at least one extra vertical space above and below it. A single displayed equation should be centered horizontally or indented a uniform distance (seven or ten spaces, for instance) from the left margin. Parentheses, brackets, integral signs, summation signs, and similar symbols should be as high as the expressions they include. Connecting words such as "hence," "therefore," and "but" should be typed flush with the left margin with at least one vertical line spacing above and below them.

While there may be variations in practice among academic specializations in matters of format, these conventions should generally be followed:

* Always use the solidus (/) for fractions in the text and for simple fractions in displayed equations.

* The use of exponent ½ is preferable to the use of the square root sign.

* A complicated expression that occurs frequently should be represented by a symbol.

* The expression "exp" should be used in place of exponents with complicated features.

* The order of symbols should be considered carefully to avoid possible misunderstanding. For example, the expression $(\underline{a} + \underline{bt})\underline{\cos} \underline{t}$ is preferable to $\underline{\cos} \underline{t}(\underline{a} + \underline{bt})$.

* Standard usage should be followed in sequences of parentheses, brackets, and braces. {... [... (...) ...]...}

* If it is possible, avoid breaking an equation within a set of parentheses, brackets, or braces.

* Symbols representing matrices or vectors should be identified by a wavy underscore.

* Transposed matrices should be indicated by the superscript uppercase letter T.

* Element arrays representing matrices must be enclosed in brackets. [...]

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* Column matrices (or vectors) may be written horizontally in braces. {...}

* Diagonal matrices may be written horizontally in special brackets. [...]

* The elements in row, column, and diagonal matrices may be separated by commas.

A department or advisor may require variations from this format to meet accepted professional practice in the relevant field.

Wherever possible, the symbols used in the report should be those that are accepted as standard in the field. If there are many symbols or if they are spread throughout the report, they should be identified in a prefatory list of symbols. If no such list is included, each symbol is normally defined where it is first used. In longer reports or where a substantial number of symbols are used, symbols are defined where first used even though a list is included in the prefatory material.

If symbols are defined in the text, the definitions are normally placed immediately following the formula or equation in which they are first used, often in a list or series that completes the sentence. If they are defined in a series, the word "where" is placed at the margin, and the series completes the sentence.

If they are placed in a list, the word "where" is placed at the margin, and the definitions are placed in a column (sometimes two columns) aligned on the equal signs.

All displayed equations should be numbered in a single series beginning with the first equation in the text and running through the last equation in the supplementary material. The equations are numbered with consecutive Arabic numerals placed in parentheses at the right margin and on a level with the last line of the equation. If the equation is repeated later in the report, it retains its originally assigned number. Equations are referred to in the wording of the text as "Equation (2)" or "Equations (2), (3), and (6)." The word "equation" can be abbreviated, as in "Eq (2)," or "Eqs (2), (3), and (6)." An alternative numbering system is to number only important equations or equations referred to later in the text.

In long reports or reports containing an unusually large number of equations, the equations can be numbered in separate series within individual sections or appendices. As with figures and tables, the number usually includes an identifying prefix and a sequential number. The preferred form is 2.1, 2.2, 2.3, and so on. Thus Eq (4.3) is the third equation in Section IV, and Eq (B.9) is the ninth equation in Appendix B. This system may be used only when pages of the text are also numbered separately by section.

In the presentation of data, metric measures are to be used instead of the usual United States measures. For example, use kilograms (kg) instead of pounds (lbs.); use meters (m) instead of feet (ft).

CHAPTER 7

Prefatory Pages

In AFIT theses and dissertations, the *prefatory material* includes the following: flyleaf, disclaimer statement, title page, approval page (dissertations only), preface, table of contents, list of figures, list of tables, list of notations or list of symbols, and the abstract. Each of these is described below.

Prefatory Material:

1. Flyleaf (unnumbered)

2. Disclaimer (unnumbered)

3. Title Page (silently numbered—i)

4. Approval Page (dissertations only) (numbered)

5. Preface or Acknowledgments (numbered)

6. Table of Contents (numbered)

7. List of Figures (numbered)

8. List of Tables (numbered)

9. List of Notations or Symbols (optional) (numbered)

10. Abstract (numbered)

Flyleaf

The *flyleaf* is placed immediately after the light cardboard cover. The flyleaf contains the following information: title of the thesis or dissertation, the identifying word "Thesis" or "Dissertation," the name(s) and rank(s) of the author(s), the thesis or dissertation designator, and the distribution statement (**see Samples 1 and 2**). This information is centered so that it is visible through the window in the cardboard cover. If the cardboard cover does not have a window, the title should be centered in the boxed area where the window would normally appear. All copies of documents reproduced and distributed by AFIT will be bound in these covers.

Disclaimer Statement

The *disclaimer statement* indicates that the opinions and ideas contained in the thesis are those of the student or students who prepared the thesis or dissertation and are not to be construed as representing official policy of the student's branch of government service. This is the standard disclaimer statement:

"The views expressed in this thesis/dissertation are those of the author(s) and do not reflect the official policy or position of the Department of Defense or the U. S. Government."

Students of foreign governments should tailor their disclaimer statements appropriately.

Title Page

The *title page* is placed immediately after the flyleaf. It duplicates the flyleaf's contents and includes additional identifying information. The contents of the title page are the thesis or dissertation designator, title of the document, the school to which it is submitted, the degree and specialization for which the document was prepared, the name(s) and rank(s) of the author(s), the month and year of graduation, and the distribution statement (**see Samples 3 and 5**). Where there are two or more authors, their names are placed in alphabetical order (**see Sample 4**). The information is spaced and centered.

Approval Page

Approval pages are required only in dissertations (**see Sample 6a**) and *EN theses* (**see Sample 6**) *Approval pages are not used in LA theses*. Signatures on the approval page indicate the official approval of the dissertation by the advisory committee and acceptance by the dean of the school. Information on the page includes the dissertation designator, the title of the document, the name (with degrees previously earned) of the author, identification of the degree and specialization for which the dissertation is submitted, and the month and year of graduation (**see Sample 6a**). Space is provided for the signatures of the committee chairman, committee members, and the dean of the school. Information is centered and spaced. The names and titles of the individuals signing the approval page should be typed below the signature lines.

Preface or Acknowledgments Page

The *preface* is an informal statement from the author to the reader about the research project and the report. Usually the preface describes the general issue addressed in the report and the reasons for choosing to research the topic (**see Sample 7**). Some general statement about the value of the research or the special applications to which it pertains may also be mentioned. The preface, however, is not an abstract of the report.

The preface is the place to acknowledge the assistance you received. Guidance and assistance from the committee chair and committee members are usually acknowledged. Substantial help from other faculty members, librarians, laboratory personnel, sponsoring organizations, or members of outside organizations may be acknowledged. If acknowledgments are the only material provided in the preface, this section can be labeled "Acknowledgments" rather than "Preface." Because the preface is an informal statement from the author to the reader, it is usually written in the first person, and the reader may be addressed in the second person. Elsewhere in the report, third person is the more conventional form.

Table of Contents

Headings in the table of contents list the contents of the document from cover to cover in the sequence in which the content appears. The table of contents is a topic outline of the report, with page numbers added to indicate where each section begins (**see Sample 8**). A linking row of dots (periods) connects the topic with the page number. There should be double spacing between the periods, and the periods should be aligned. The page number column should be right justified. The wording of headings and subheadings in the body of the report and in the table of contents **must be identical.** Main document sections, subsections, and (when present) sub-subsections are listed with progressive indentation of subordinate headings to indicate relative value of topics described.

Use *Roman numerals* to label main sections. You may use *Arabic numbers or letters* to designate lower ranking headings. In the table of contents list all prefatory material except the flyleaf, disclaimer, title page, and the table of contents itself. All supplementary material is also listed. Each appendix is listed with its letter designation and a descriptive title; the title of the appendix should be identical to the title shown in the table of contents.

Lists

Most theses and dissertations contain *lists* showing the titles and locations of figures and tables contained in the report. Where it would be helpful to the reader, a list of symbols or notations is also included. Similarly, a short list of definitions of specialized technical terms may be included in the prefatory material. Longer lists of definitions or symbols should be placed in an appendix.

List of Figures

The *list of figures* includes all figures, whether they are in the text itself or in appendices. The term "figure" means all graphic aids except tables. Figures include drawings, photographs, flow charts, wiring diagrams, and so on. The layout of the list of figures is similar to that of the table of contents (**see Sample 9**). Each figure is assigned an Arabic number and given a descriptive title. Provide a page number for every figure in the report.

List of Tables

The *list of tables* includes all tables that appear in the document, in the sequence in which they are presented. The format is similar to that of the list of figures or table of contents (**see Sample 10**). Most thesis advisors prefer the use of Arabic numbers for both figures and tables. *NOTE: Be sure to number figures and tables separately.*

Other Lists

You may want to include a list of all symbols used in the report and give their definitions. Even though you have defined each individual symbol in the text when it is first used, and even though the symbols may be relatively common in your field, a list of symbols (sometimes called "notation") can be a convenience to the reader. Consult your advisor if you are unsure about including such a list.

You may also include lists of specialized technical terms and their definitions or lists of acronyms in the prefatory pages. Another option is to place the lists in an appendix—especially if the list is longer than two pages. If you place a list in an appendix, call it a glossary of technical terms or glossary of acronyms. In either location, the terms in the list are alphabetized. Tell your readers at some point of the existence and location of the list.

Abstracts

All theses actually contain two abstracts, one in the text and one located in the appropriate space on the SF 298. The "in text" abstract should be no more than two pages long, preferably one page (**see Sample 11**). The second abstract, included in the SF 298 attached to the end of the thesis, is limited to an absolute maximum of 200 words. The best practice is to write one good 200-word abstract and use it in the text and on the SF 298. The abstract is the last item included in the prefatory material.

The abstract summarizes the information contained in the report. The main items to be described in the abstract include the problem statement, the methodology followed in the thesis, the findings, and the conclusions. Obviously, it is impossible to say very much about all of these aspects in 200 words. But the reader should be able to discover the content and the methods used in the thesis by reading the abstract. The abstract is not a preface; it is a succinct statement of the important aspects of the thesis.

In a report on an experimental subject, for example, the abstract would identify the problem that was studied, the equipment and procedures used, the results obtained, and the conclusions drawn. An abstract that lacks this basic information is of little value to the potential readers. Writers of theses and dissertations should remember that abstracts are usually republished in other reference volumes or electronic databases to help specialists keep informed about developments in their field or to provide a means of identifying reports that they may want to obtain and read.

Dissertations contain both abstracts described above, as well as a third abstract with a maximum length of 350 words which is used for reference volumes dedicated to the publication of dissertation abstracts (**see Sample 24**).

Thesis or Dissertation Designators

In accordance with *AFIT Regulation 53-15*, each thesis or dissertation is assigned an identifying alphanumerical designator which appears on the flyleaf, title page, abstract, and SF 298. In dissertations, it is also included on the approval page.

Thesis Designator

The *thesis designator* is assigned by the department supervising the work (in EN) or by the Thesis Program Administrator (in LA). The four parts of the designator are:

1. Abbreviation for Air Force Institute of Technology (AFIT).

2. An alphabetical symbol identifying the student's educational program (such as GAE, GLM, ENY).

3. An alphabetical symbol identifying the department supervising the thesis project (such as ENG, LAS).

4. An alphanumerical symbol identifying the year in which the thesis is completed, the month of completion, and position (in alphabetical order) of the author's surname within the group completing the educational program that year.

If the thesis is written by two or more authors, the order will be the alphabetical order of the authors' last names.

> *Designator Examples:*   AFIT/GSM/LAL/90S-6
> AFIT/GE/ENG/91D-17

Dissertation Designator

The dissertation designator will be assigned by the chair of the student's advisory committee. The four parts of the dissertation designator are:

1. Abbreviation for Air Force Institute of Technology (AFIT).

2. The letters DS.

3. An alphabetical symbol identifying the departmental affiliation of the research committee chair.

4. A numerical symbol identifying the year in which the dissertation is accepted (not necessarily the year assigned to identify the student's class section). This symbol is followed by a number assigned in sequence by the responsible department to identify the dissertation among those produced under its guidance during the year.

   Example: AFIT/DS/ENG/90-1

CHAPTER 8

Supplementary Materials

The *supplementary materials* in a thesis or dissertation consist of the parts of the document that are placed after the last chapter of the report. Supplementary materials consist of the appendices, bibliography, vita, the Category and Distribution Statement, and the Report Documentation Page, commonly referred to as the Standard Form (SF) 298.

Appendices

An *appendix* contains material that supports the text; its contents explain or present further details about some portion of the text. Appendices might contain data from which an extended series of curves was developed, or they might contain computer programs, calibration procedures, sample calculations, sample survey forms, lengthy quotations, or other details that could distract or delay the reader if they were placed in the body of the text (**see Sample 19**). Generally, the *discussion within an appendix is confined to a single topic*.

Multiple detailed topics typically require multiple appendices. Begin each appendix on a new page. If there is only one appendix, call it simply "Appendix," and give it a descriptive title, as in "Appendix: Data Tables." If there are multiple appendices, assign them successive capital letters: Appendix A, Appendix B, and so on. *Be sure to give each appendix a title*. Center the appendix letter and title at the top of the page in the same fashion as other main headings in the report are prepared. *Separate title pages for appendices are not necessary*. Margins and other format features of appendices are the same as for normal pages of the text.

In the Table of Contents, list the appendix letter, descriptive title, and page number. *Be sure to mention each appendix at an appropriate place in the text*. For example, where the discussion of a particular curve begins, you might write, "The data from which this curve was plotted are shown in Appendix C." If you fail to mention an appendix, the reader might not be aware of its existence and usefulness.

Vita

Each AFIT thesis and dissertation concludes with a brief, one-page, biographical sketch (or *vita)* of the author or authors (**see Sample 20**). Write the vita in the third person and include the most important facts about your life. If you have extensive military or federal service, focus primarily only on information related to the field in which your AFIT degree will be granted. End the narrative with your entry into AFIT, or, if known with certainty, your follow-on assignment. Place your *permanent mailing address* in the lower right-hand corner of the page. In theses having more than one author, the *vita for each author is placed on a separate page* and the pages placed in alphabetical order according to the first letter of the authors' last names.

Distribution Statements and SF 298

The appropriate Department of Defense distribution statement must be placed on the flyleaf, title page, and SF 298 **(see Sample 21)** of each thesis and dissertation produced at AFIT. The distribution statement is also indicated on the Thesis Distribution Memorandum **(see Samples 22, 22a and 23)**. The Department of Defense Directive 5230.25, "Withholding of Unclassified Technical Data from Public Disclosure," and Department of Defense Directive 5230.24, "Distribution Statements on Technical Documents," state the policy for marking and disseminating DOD technical documents.

To carry out the policy accurately, you *should*:

1. Be aware that DTIC documents may be governed by limitations of distribution of information the document contains. This information should be clearly shown on the SF 298 (or the earlier DOD Form 1473) which accompanies these documents.

2. Be sure to make photocopies of the SF 298 (or the earlier DOD Form 1473) from any DTIC document you use whose DTIC number begins with a **prefix other than** AD-A(+ numerals) or AD(+ numerals). Be certain that the photocopy clearly shows the distribution statement and the name of the controlling agency.

After you have prepared the final bibliography for your thesis or dissertation, count the number of limited distribution documents listed in the bibliography.

* If you cited no limited distribution documents, and if you and your advisor have no other reason for limiting distribution of your report, use Statement A (described below).

* If you cited one or more limited distribution sources, your thesis or dissertation may need to be limited to the same level of distribution as your most restricted source. For example, if your source is limited by the restraints of Statement D, your report may be limited by the restraints of Statement D (described below).

You should consult your thesis or dissertation advisor to determine the proper distribution statement to use.

The distribution statements (Statements A through F) and the explanations of their use are presented below. Statement G is a special statement applicable to a small number of theses or dissertations. These statements are applicable only to documents prepared by DOD agencies and do not pertain to documents or materials available to the general public.

Statement A

The text of Distribution Statement A reads:

"APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED."

This statement may be used only in connection with unclassified documents that have been cleared for release by competent authority in accordance with DODD 5230.9. Documents governed by this statement may be made available or sold to the public, including foreign nationals, companies, and governments, and may be exported without a license.

This statement may never be used on documents that were formerly classified, without a positive determination of such releasability by the controlling DOD office prior to release. **This statement is not to be used on classified documents.**

Statement B

The text of Distribution Statement B reads:

"DISTRIBUTION LIMITED TO U. S. GOVERNMENT AGENCIES ONLY; (FILL IN REASON FROM LIST BELOW) (DATE). OTHER REQUESTS FOR THIS DOCUMENT MUST BE REFERRED TO (INSERT NAME OF APPROPRIATE CONTROLLING AGENCY)."

This statement may be used on unclassified documents, or on classified documents if necessary to ensure distribution limitation in addition to need-to-know requirements imposed by DODD 5200.1-R, or in the event the document is declassified.

Reasons for imposing Distribution Statement B include:

* *Foreign Government Information.* To protect information and limit distribution in accordance with the desires of a foreign government that furnished the information. Information of this type is usually classified at the CONFIDENTIAL level or higher in accordance with DODD 5200.1-R

* *Proprietary Information.* To protect information not owned by the U. S. Government and not protected by a contractor's "limited rights" statement but received with the understanding that it would not be transmitted outside of U. S. Government offices.

* *Test and Evaluation.* To protect results of tests and evaluations of commercial products or military hardware, when such disclosure might cause unfair advantage or disadvantage to the manufacturer of the product.

* *Contractor Performance Evaluation.* To protect information in management reviews, records of contract performance evaluations, or other advisory documents evaluating programs of contractors.

* ***Export Limitations.*** To protect information that may be released to foreign nationals by U. S. Government agencies only when approved by competent authority, or to protect information that would require an export license if foreign release is intended.

* ***Administrative/Operational Use.*** To protect technical or operational data or information from automatic dissemination under the Technical Exchange Program or by other means, including publication required solely for official use or strictly administrative or operational purposes. This statement may be applied to manuals, pamphlets, technical orders, technical reports, and other publications containing valuable technical or operational data.

* ***Software Documentation.*** To protect information released only in accordance with the provision of DOD Instruction 7930.2.

* ***Specific Authority.*** To protect information not specifically included in the above reasons, but which requires protection pursuant to valid documented authority such as Executive Orders, classification guidelines, Export Administration Regulations (EAR), International Traffic in Arms Regulations (ITAR), and DOD or DOD component regulations or policy guidance. When filling in the reason in the Statement, cite "Specific Authority (identification of valid documented authority)."

Statement C

The text of Distribution Statement C reads:

"DISTRIBUTION LIMITED TO U. S. GOVERNMENT AGENCIES AND THEIR CONTRACTORS; (FILL IN REASON) (DATE). OTHER REQUESTS FOR THIS DOCUMENT MUST BE REFERRED TO (INSERT NAME OF APPROPRIATE CONTROLLING AGENCY)."

Statement C may be used on unclassified documents or on classified documents if necessary to ensure distribution limitation in addition to need-to-know requirements imposed by DODD 5200.1-R, or in the event the document is declassified.

Reasons for applying Distribution Statement C include:

* ***Critical Technology.*** To protect information and technical data which advances state-of-the-art technology or describes new technology in an area of significant or potentially significant military application, or relates to a specific military deficiency of a potential adversary. This control of information pertaining to critical technology is intended to allow early dissemination to the U. S. Government and its contractors in a manner that will ensure compliance with the International Traffic in Arms Regulations (ITAR) and Expert Administration Regulations (EAR).

* ***Administrative/Operational Use.*** Same as described under Distribution Statement B.

* ***Specific Authority.*** Same as described under Distribution Statement B.

Statement D

The text of Distribution Statement D reads:

"DISTRIBUTION LIMITED TO DOD AND DOD CONTRACTORS ONLY; (FILL IN REASON) (DATE). OTHER REQUESTS FOR THIS DOCUMENT MUST BE REFERRED TO (INSERT NAME OF APPROPRIATE CONTROLLING AGENCY)."

Distribution Statement D may be used on unclassified documents or on classified documents if necessary to ensure distribution limitation in addition to need-to-know requirements imposed by DODD 5200.1-R, or in the event the document is declassified.

Reasons for imposing Distribution Statement D include:

* *Premature Dissemination.* To protect information on systems or hardware in the developmental or conceptual stage, information which must be protected to prevent premature dissemination.

* *Software Documentation.* Same as described under Distribution Statement B.

* *Critical Technology.* Same as described under Distribution Statement C.

* *Specific Authority.* Same as described under Distribution Statement B.

Statement E

The text of Distribution Statement E reads:

"DISTRIBUTION LIMITED TO DOD COMPONENTS ONLY; (FILL IN REASON) (DATE). OTHER REQUESTS FOR THIS DOCUMENT MUST BE REFERRED TO (INSERT NAME OF APPROPRIATE CONTROLLING AGENCY)."

Distribution Statement E may be used on unclassified documents or on classified documents if necessary to ensure distribution limitation in addition to need-to-know requirements imposed by DODD 5200.1-R, or in the event the document is declassified.

Reasons for imposing Distribution Statement E include:

* *Foreign Government Information.* Same as described under Distribution Statement B.

* *Premature Dissemination.* Same as described under Distribution Statement D.

* *Software Documentation.* Same as described under Distribution Statement B.

* *Critical Technology.* Same as described under Distribution Statement C.

* *Specific Authority.* Same as described under Distribution Statement B.

Statement F

The text of Distribution Statement F reads:

"FURTHER DISSEMINATION ONLY AS DIRECTED BY (INSERT NAME OF APPROPRIATE CONTROLLING AGENCY)."

Distribution Statement F is normally used only on classified documents but may be used on unclassified documents when specific authority exists. Distribution Statement F is used when the DOD originator determines that the information is subject to special dissemination limitation specified by paragraph 4-505, DODD 5200.1-R. When a classified document assigned Distribution Statement F is declassified, the statement will be retained until the controlling office assigns the proper distribution statement.

Statement G

The text of Distribution Statement G reads:

"NOT TO BE DISTRIBUTED THROUGH INTERLIBRARY LOAN OR PUBLISHED THROUGH DTIC OR DLSIE."

In rare instances, a thesis might not be suitable for distribution. This condition might occur when the execution of the research is weak, when conclusions are not supported, or when information was supplied with the proviso that the result not be circulated. In such cases, the thesis will be retained in the school. It will not be circulated through DTIC, DLSIE, or the interlibrary loan system.

Export Control Law Statement

In addition to the distribution statement described above, the following notice may be placed on all documents assigned Distribution Statements B, C, D, E, or F:

"WARNING: SUBJECT TO EXPORT CONTROL LAWS

THIS DOCUMENT CONTAINS INFORMATION SUBJECT TO THE INTERNATIONAL TRAFFIC IN ARMS REGULATIONS (ITAR) OR THE EXPORT ADMINISTRATION REGULATIONS (EAR) OF 1979 WHICH MAY NOT BE EXPORTED, RELEASED, OR DISCLOSED TO FOREIGN NATIONALS INSIDE OR OUTSIDE THE UNITED STATES WITHOUT FIRST OBTAINING AN EXPORT LICENSE. A VIOLATION OF THE ITAR OR EAR MAY BE SUBJECT TO A PENALTY OF UP TO 10 YEARS IMPRISONMENT AND A FINE OF $100,000 UNDER 22 U.S.C. 2778 OR SECTION 2410 OF THE EXPORT ADMINISTRATION ACT OF 1979. INCLUDE THIS NOTICE ON ANY REPRODUCTION OF THIS DOCUMENT."

Thesis Distribution Memorandum

To ensure that the proper distribution statement appears on the thesis or dissertation and that copies are sent to the appropriate recipients, the advisor should sign the Thesis Distribution Memorandum, which the student will receive in April to be returned to LAC some time in May **(see Sample 24)**. When the completed thesis is turned in, make sure all information is still correct. **(Verify that the Distribution Statement selected is the correct statement for the thesis and the memo is signed by the primary thesis advisor.)** Because some departments in the School of Engineering may not require this form, EN students should contact their departments for guidance.

Release Checklist

The Release Checklist (Sample 22b) should be completed by the student and signed by the student in the *Originator* signature block; the advisor should review the Checklist and sign in the *Release Authority* block. The signatures on the Release Checklist certify that the material contained in the thesis is releasable to the general public, or, if the material is restricted, that fact is appropriately indicated on the Release Checklist, in the Thesis Distribution Statement, and on the Report Documentation Form (SF 298). The relevant publications are listed on the Release Checklist; AFIT/PA should be consulted if questions arise concerning the Release of the material. Thesis approval offices (LAC, ENR) will maintain files of the original copies of the Release Checklist.

Report Documentation Form (SF 298)

Every thesis and dissertation must include the report documentation form known as the Standard Form (SF) 298 **(see Sample 21)**. *The SF 298 replaced the DD Form 1473 usually found with all documents ordered from DTIC prior to 1989.* These are the *instructions for completing the SF 298*. The instructions are keyed to block numbers on the form; all material must fit within the space of the blocks on the form.

Block 1. Leave blank.

Block 2. Month and year of your graduation (not the month you turn in the thesis).

Block 3. Enter the phrase **Master's Thesis** or **Doctoral Dissertation**.

Block 4. Enter the complete title of the thesis or dissertation. **All letters in the title are capitalized.**

Block 5. Leave blank.

Block 6. Enter name in normal order (John R. Smith). If military, add rank and branch of service. If civilian, enter GS rank and sponsoring agency. Follow alphabetical order for two or more authors.

Block 7. Enter the following address: Air Force Institute of Technology, 2750 P Street, WPAFB OH 45433-7765.

Block 8. Enter your thesis or dissertation designator
(For example: AFIT/GLM/LAL/97S-10).

Block 9. Enter the name, rank, title, and complete address (including street number and zip code) of your sponsor, if you have one; enter N/A if there is no sponsor.

Block 10. Leave blank.

Block 11. Follow instructions on the reverse side of the SF 298. Use this block only if applicable. Otherwise, leave blank.

Blocks 12a and 12b. In 12a, enter the appropriate distribution statement. Leave block 12b blank.

Block 13. Enter a short abstract. Maximum length 200 words.

Block 14. Enter four or five key words or phrases. Choose at least four of these terms from the DTIC Thesaurus, a reference guide located near the reference desk in the AFIT Library. Use of these terms will ensure that your document can be readily located by other researchers conducting DTIC searches.

Block 15. Enter the total number of all pages in the thesis dissertation, including title page and all pages containing Roman numerals.

Block 16. Leave blank.

Blocks 17, 18, 19. Enter appropriate classification or the word "Unclassified."

Block 20. Enter either UL (unlimited) or SAR (same as report), whichever is appropriate.

CHAPTER 9

Preparing and Submitting the Final Copy

The current American National Standards Institute (ANSI) publication Z39.18 (<u>Scientific and Technical Reports: Organization, Preparation, and Production</u>) will be adhered to as closely as possible on all matters of format, except where standard academic practice dictates minor departures. Each MS and Ph.D. student will submit the materials listed in AFIT Regulation 53-15 to the department or committee chair at the time specified in school directives. The original copy of the thesis will be boxed, and all other copies placed in AFIT blue covers (EN) or in large manila envelopes (LA).

Submission of Final Copy

The calendar year deadlines for activities leading up to graduation change each year, depending on the date of the graduation ceremony. Each school provides students a list of deadlines for key events linked to graduation, including the desired submittal date for theses and dissertations. In EN, dates are announced by the respective departments; in LA, by LAC. *Ensure that you know these dates and meet their deadlines.*

Material must be submitted as specified in *AFITR 53-15* and applicable Operating Instructions of the resident schools. *Originals and copies of theses and dissertations must be clean, clear, and suitable for reproduction. Materials must be submitted and accepted on or before the final acceptance date established by the schools.*

Thesis

When turning in thesis materials, you *must include* the following items as indicated:

* The typed or word-processed original and one copy (for LA), original and four copies (for EN sponsored theses), or original and three copies (for EN non-sponsored theses). The DTIC copy should be one-sided; the other copies can be printed on two sides. For both schools, the original should be boxed or placed in a secure folder (one that can be tied closed). In LA, the copy should be submitted in a secure folder; in EN, the copies should be bound in blue AFIT covers. A completed SF 298 will be included as the last page in the originals and copies for both schools.

* Two additional separate copies of the SF 298 will be submitted with the thesis in EN and LA. Photocopies are acceptable.

* EN students should obtain guidance from their departments in regard to inclusion of a Dissertation Distribution form.

* Negatives of all photographs used in the thesis will be included with the original if required by the supervising department or thesis advisor.

Dissertation

When turning in dissertation materials, you *should include* the following items (**see Sample 26**):

* The typed or word-processed original and four copies (photocopies are acceptable). The original should be boxed, and the four copies bound in blue AFIT covers. A completed SF 298 will be included as the last page in each. One copy of a Ph.D. dissertation should be on 100% rag and all other copies may be on regular bond copy paper.

* An additional copy of the SF 298 will be submitted with the original.

* The dissertation must contain the original dissertation approval page signed in ink by the Dean and the members of the advisory committee. A copy of this page will be included in each copy of the dissertation, and an additional separate copy will be submitted with the original.

Additional Doctoral Information

In addition to the material submitted to the school, each EN doctoral candidate will submit the following items to AFIT/ENR as soon as the dissertation is accepted:

* Completed Survey of Earned Doctorates. This form is available from the office of the Associate Dean for Research (AFIT/ENR).

* Completed University Microfilms Agreement Form. This form is also available from AFIT/ENR

* A certified check made out to University Microfilms. The office of the Associate Dean for Research will provide the amount of the check charged by University Microfilms at your date of graduation.

* Two copies of the special dissertation abstract. This abstract must fit on one page with a maximum of 350 words and must include the advisor's name.

* The completed List of Scholarly Publications. This form is also available from AFIT/ENR.

Ph.D. completions are entered into the officer records as soon as all doctoral requirements are satisfied (any time during the academic quarter).

Processing

After the completed thesis or dissertation has been accepted, the individual schools will process, reproduce, and transmit copies of the documents to the Defense Technical Information Center (DTIC). The AFIT/ENR office will process dissertations through University Microfilms.

Electronic Copies

Both MS theses and Ph.D. dissertations will be submitted on a *diskette as well as in hard copies.* The following instructions apply:

a. DTIC will accept most common word processors, WORD, Word Perfect, LaTex and certainly a plain text or ASCI file. Postscript files are also acceptable. Other word processors may be acceptable. The diskette should be a 3-1/2 inch floppy, any density. DOS, Windows 95, UNIX, or MAC operating systems are acceptable. The files may be (but are not required to be) compressed. DTIC will accept pkzip or any Unix compression routine.

b. Please state the operating system on the diskette label, e.g. "DOS," "MAC," "UNIX," etc. State compression used (if any).

c. Also please name your file(s) as indicated below and use one of the following three statements on the label of your diskette:

(1) "Complete file = *GxxENznn.sss" where Gxx is your class designator, Enz or Laz is your department designator and nn is the two digit number assigned by the Department as your thesis number. Note this is the same as your full thesis designator except that "AFIT," "95D" and all slashes and dashes are omitted. The suffix, sss, should be DOC, WP, TEX, txt or PS depending on the word processor used. EXAMPLES GAPENP06.DOC, DSENG02.TEX.*

(2) "Text on *filename (same as above),* Auxiliary figures/drawings on *[multiple] filename(s)" (of your choice).*

(3) "Text on *filename (same as above).* Some figures/drawings not included. (See hard copy)." Both statements b. & c. may be applicable to some submissions.

d. In addition, please indicate on the diskette label either:

(1) "SF 298 is included in *filename" (as above)* or

(2) "See hard copy for SF 298."

e. If the thesis or dissertation requires more than one diskette (especially those that contain several picture files requiring fractional megabytes of memory, the student may direct file transfer the thesis or dissertation to DTIC. Check with your School Office of Research and Consulting for the current FTP address. In the case of direct file transfers the student must submit evidence that DTIC has received and accepted the thesis at the time of final thesis turn in. This receipt will be accepted in lieu of a diskette.

APPENDIX A

THESIS CHECKLIST

This is the checklist that LAC personnel use to check theses. It does not cover everything that can go wrong, but it does contain the *most common errors.*

1. **THESIS DESIGNATOR**: Make sure you have the correct designator and check all pages on which it appears:

   a. Cover Page (Flyleaf)
   b. Title Page
   c. SF Form 298
   d. Abstract

2. **THESIS TITLE**: Make sure it is the **SAME** on all of the following:

   a. Thesis Acceptance Sheet
   b. Cover Page
   c. Title Page
   d. Thesis Distribution Memorandum
   e. SF Form 298
   f. Top of the first page of Chapter I

3. **COVER PAGE**: Make sure the title fits the cut-out area on the blue cover.

4. **TITLE PAGE**: Check the Title Page for format. Make sure the graduation month and year are correct—**September 1998** for Class 98S.

5. **SF 298 FORM**: Check to assure all information is included. Follow the instructions given in the <u>Style Guide</u> (Pages 54-55, 85). **Be sure to complete the *sponsor* information in Block 9.**

   a. Everything that is supposed to be in caps is in caps—title and designator.

   b. Block 13 (Abstract). Maximum of 200 words.

   c. Make sure Block 14 is filled in correctly. Choose at least 4 terms from the DTIC Thesaurus, a reference guide located near the reference desk in the library.

   d. Make sure the *page count* is correct in Block 15. Count as follows: sum of all Roman numeral pages + sum of all Arabic numeral pages +4; (this number includes the Flysheet, Disclaimer Page (LAC will insert), AFIT Research Assessment Sheet, and SF-298 (front).

6. **THESIS DISTRIBUTION MEMORANDUM.** Since this form was previously turned in, make sure all information is still *correct.* (*Verify* that Distribution Statement selected is the correct statement for your thesis and the memo is signed by your primary thesis advisor.) See pages 49-53 of the <u>Style Guide</u> for Distribution Statements. **In addition, each student whose**

thesis is "approved for public release; distribution unlimited" must fill out a Release Checklist.

7. TABLE OF CONTENTS:

a. Be sure to put the word **"Page"** above the numbers on all pages of the Table of Contents. See samples on pages 71-74 of the Style Guide. This includes the List of Figures and List of Tables.

b. Make sure titles are **EXACTLY** the same as the titles on page listed.

c. If a title has two lines, the second line should be single-spaced under the first line. **DO NOT** indent the second line; the second line should have the same left margin as the first line.

8. MATCHING TITLES.
Go through each page of the thesis to make sure that the title is *EXACTLY* the same in the Table of Contents or List of Tables/Figures as it is on the actual page. This is where most errors are found in theses.

9. CHAPTER HEADINGS:
Check the chapter headings to see that they are in the proper format. See page 33 and sample on page 76 of the Style Guide.

a. Page 33 of the Style Guide has the format for the first chapter, (which has the title of the thesis at the top of the page). *This is true for Chapter I only!* If the thesis title has two lines, double-space and center the second line under the first line.

b. Headings on chapters, tables, figures, appendices, etc. may be single or double spaced. Center the second line of the heading under the first line of the heading; be consistent throughout the report.

10. MARGINS:
Spot check the margins. The top margin should be 1 inch, the other margins should be 1-1/4 inch. Page number approximately 3/4 inch from bottom. Page 32 of the Style Guide.

11. BIBLIOGRAPHY:
IMPORTANT. Check for AD Numbers—if different than AD-A (ex: AD-B); it may require a "limited" distribution. Sample pages in the Style Guide are 81-82. **AD numbers should be set up correctly,** i.e., (AD-A123456 or ADA123456). Other items to watch for:

a. Make sure the citations in text correspond with entries in Bibliography.

b. Make sure the entries are in alphabetical order.

c. There should *not* be a comma between city and state.

d. Use 2-letter state abbreviations.

e. There should *not* be a period after abbreviated military ranks.

f. There should *not* be periods between DC in Washington DC.

12. **VITA:** Check the vita for proper format. Page 48 and sample on page 84 of the <u>Style Guide</u>. In the case of dual authors, each author provides a separate vita.

13. **PAGE NUMBERS:** Be sure that all pages that should be numbered are. Make sure all pages are present and in their correct order.

14. **UNDERSCORING:** Can be broken or straight lines; must be consistent (Page 31 of <u>Style Guide</u>).

APPENDIX B

Sample Thesis and Dissertation Pages

AFIT/GCM/LAS/95S-2

AN AIR FORCE GUIDE FOR EFFECTIVE
MEETING MANAGEMENT

THESIS

Zackery S. Belcher, Captain, USAF

AFIT/GCM/LAS/95S-2

Approved for public release; distribution unlimited

Sample 1. Flyleaf, Single-Author Thesis

AFIT/GCM/LAS/93S-6

MEASURING PRODUCTIVE EFFICIENCY
IN AIR FORCE OPERATIONAL CONTRACTING
SQUADRONS: AN APPLICATION OF
DATA ENVELOPMENT ANALYSIS

THESIS

DENNIS W. GROSECLOSE   DOUGLAS E. JAMES
CAPTAIN, USAF   CAPTAIN, USAF

Approved for public release; distribution unlimited

Sample 2. Flyleaf, Dual-Author Thesis

AFIT/GCM/LAS/95S-2

AN AIR FORCE GUIDE FOR EFFECTIVE MEETING MANAGEMENT

THESIS

Presented to the Faculty of the Graduate School of Logistics

and Acquisition Management of the Air Force Institute of Technology

Air University

Air Education and Training Command

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Contracting Management

Zackery S. Belcher, B.S., M.B.A.

Captain, USAF

September 1995

Approved for public release, distribution unlimited

Sample 3. Thesis Title Page, Single Author

AFIT/GIR/LAR/94D-5

BUSINESS PROCESS RE-ENGINEERING APPLIED TO

THE AIR FORCE INSTITUTE OF TECHNOLOGY

OFFICE OF THE REGISTRAR, RECORDS MANAGEMENT

THESIS

Presented to the Faculty of the Graduate School of Logistics

and Acquisition Management of the Air Force Institute of Technology

Air University

Air Education and Training Command

in Partial Fulfillment of the Requirements for the

Degree of Master of Science in Information Resource Management

Connie C. Hutchinson, B.A.
Captain, USAF

Alison F. McCoy, B.S.
Captain, USAF

December 1994

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Sample 4. Thesis Title Page, Dual Author

AFIT/DS/ENG/92-2

MULTIPLE MODEL ADAPTIVE ESTIMATION

FOR SPACE-TIME POINT PROCESS OBSERVATIONS

DISSERTATION

Presented to the Faculty of the School of Engineering

of the Air Force Institute of Technology

Air University in Partial Fulfillment of the

Requirements for the Degree of

Doctor of Philosophy

David E. Meer, B.S., M.S.

Captain, USAF

December 1992

Sample 5. Dissertation Title Page

AFIT/MS/ENG/92-2

MULTIPLE MODEL ADAPTIVE ESTIMATION

FOR SPACE-TIME POINT PROCESS OBSERVATIONS

John C. Jones, B.S., M.S.
Captain, USAF

Approved:

_____   _____
                Chairman   date

_____   _____
                                                            date

_____   _____
                                                            date

Sample 6. MS Thesis Approval Page (for EN students)

AFIT/DS/ENG/92D-2

MULTIPLE MODEL ADAPTIVE ESTIMATION

FOR SPACE-TIME POINT PROCESS OBSERVATIONS

David E. Meer, B.S., M.S.
Captain, USAF

Approved:

Date

_____   _____
John J. D'Azzo (Chairman)

_____   _____
William P. Baker (Dean's Representative)

_____   _____
Scott M. Davis

_____   _____
Howard J. Neff

Accepted:

_____
Robert A. Calico
Dean, Graduate School of Engineering

Sample 6a. Dissertation Approval Page

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Acknowledgments

Sample 7. Acknowledgments

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Sample 8. Table of Contents

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Sample 8. Table of Contents (continued)

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Sample 9. List of Figures

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Sample 10. List of Tables

AFIT/GIR/LAR/94D-6

Abstract

The Department of Defense (DoD) has budgeted over $9.8 billion for 1995 for information

technology, yet many workers let their existing systems sit idle. This thesis explores why these computers

are sitting idle. This researcher's initial hypothesis was that certain features of the human-computer interface

can positively or negatively affect efficiency, retention, and satisfaction level of workers. Although research

is being done, interfaces continue to be of poor quality, especially in the DoD, where long procurement

cycles, forced purchases, and limited budgets result in out-of-date software.

This thesis looks at four features and two interactions of the human-computer interface, color, white

space, parallelism, and verb tense. While the researcher offers no significant statistical results, important

advances are made in understanding the scientific method, experimentation, and the importance of these

features. The results of the study discussed here suggest that features of the human-computer interface

interact with one another, but this researcher's conclusion is that the extent to which any one or combination

of features affect the overall performance of the subjects is impossible to ascertain using conventional linear

methods. Instead, the sciences of complexity can account for the results of this study, since the entire effort

made the erroneous assumption that the features independently affected the subjects' comprehension,

satisfaction level, and speed. For managers and researchers, answering the question "Is this a linear

relationship?" should be the first step in undertaking any research problem. If the answer is that the system

is not linear, then more up-front consideration for modeling and analyzing the problem must be done for the

project to yield any significant results.

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Sample 11. Abstract (in text)

MEASURING USER SATISFACTION OF THE ELECTRONIC MAIL SYSTEM AT

AIR FORCE MATERIEL COMMAND HEADQUARTERS AS AN INDICATOR OF

THE SYSTEM'S EFFECTIVENESS

I. Introduction

General Issue

The Air Force Materiel Command (AFMC) has installed a local area network designed to connect

3,000 users throughout its headquarters at Wright-Patterson Air Force Base. One of the principal goals of

the network is to provide users with a powerful electronic mail system capable of meeting the users'

communications needs (Strong, 1993).

The AFMC initially allocated $9 million to fund the network project which began in May, 1991

(Strong, 1993). Currently, 2,600 users are connected to the network through a series of 35 file servers.

The network is managed by AFMC's Office Automation staff with TRW, Inc. acting as the primary

contractor.

This local area network and its electronic mail system represent a major investment in an

information system which is considered to be the model for the Air Force. For example, this system has

already been installed at Air Mobility Command Headquarters at Scott Air Force Base and is

Sample 12. First Page of Thesis. This sample also illustrates the first three levels of headings.

were extracted from the article "Distribution and Repair In Variable Environments (DRIVE) Model Logic" by Richard Moore and Bob McCormick (McCormick and Moore, 1992).

Section 1 - The DRIVE System

The Weapon System Management Information System (WSMIS) is a decision support system that assesses logistics support, focusing on weapon system availability. DRIVE makes up two modules within WSMIS; D087J (Classified DRIVE) and D087K (Unclassified DRIVE). DRIVE extends the WSMIS approach of logistics capacity assessment to the Air Logistics Center (ALC) level by defining repair and distribution priorities, based on elements such as aircraft availability goals, planned flying hours, and worldwide asset position (see Figure 2 below).

Logistics command
and control system

Aircraft Availability
goals, force posture,
planned operating tempos

AFLC data systems

Output lists

Worldwide asset
position, item
characteristics

DRIVE

Repair
sequence

Distribution
actions
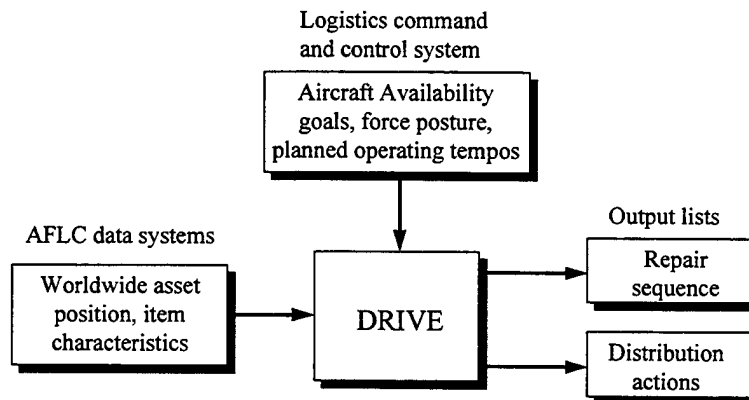
Figure 2. Basic DRIVE Architecture (Abell and others, 1992)

DRIVE prioritizes the repair of exchangeable items (Line Replaceable Units (LRU) and Shop Replaceable Units (SRU)) so the greatest increase in base level weapon system availability is achieved per repair sources expended.

Sample 13. Figure in Text

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for estimating demand for reparable (rotable) aircraft parts. American Airlines Decision

Technologies Division developed a PC-based decision support system called the Rotable

Allocation and Planning Systems (RAPS) to provide forecasts of rotable parts demand.

Table 2. Summary of Models

MODEL	METRIC	MOD-METRIC	VARI-METRIC	DYNA-METRIC
Indenture	Single	Multiple	Multiple	Multiple
Echelons	Multiple	Multiple	Multiple	Multiple
Number of Items	Multiple	Multiple	Multiple	Multiple
Location	Multiple	Multiple	Multiple	Multiple
Demand Assumptions	Steady state, independent, and stochastic demand (Poisson)	Steady state, independent, and stochastic demand (Poisson)	VTMR > 1, independent, stochastic, Poisson demand. Pipeline quantities have negative binomial distribution	Dynamic instead of steady state. Stochastic, multi-period. Considers time dependent scenarios.
Objective	Minimize expected backorders	Minimize LRU backorders	Maximize aircraft availability	Readiness, sustainability, and sortie generation

RAPS provided a multi-million dollar benefit for American Airlines, upon initial implementation,

through the identification of over and under allocated parts (Tedone, 1989:62).

Sample 14. Table in Text

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included classroom teachers per pupil, support staff per pupil and administrative staff per pupil. Output measures included student scores on proficiency exams (44:1625).

5. When examining the efficiency of highway maintenance patrols, Cook et al. addressed the need to develop a measurement technique capable of handling non-economic factors. These factors included average age of pavement, number of accidents, and traffic volume per day (17:114).

Difficulty Estimating a Service Sector Production Function. The previously examined problems, caused by lack of quantifiable measures, relates to a larger theoretical problem when measuring public and service sector organizations. In economic terms, it is difficult to estimate a production function or appropriate production possibilities frontier in public organizations.

> Methods for evaluating the relative productivity of units in the public sector have lagged behind similar applications where production functions were more directly obtainable. (7:57)

The difficulty in establishing an appropriate production function, coupled with the measurement problems previously identified, lead researchers to look for an alternative technique for measuring performance.

Traditional economic theory defines a production function as the relationship between inputs and outputs where the quantity produced is equal of some function of

Sample 15. Numbered Citations in Text. This sample also illustrates the fourth level of heading.

organization with a viable substitute for economic or productivity measures. Throughout the literature, user satisfaction has been widely accepted as a surrogate measure for system success (Bailey and Pearson, 1983:530; Raymond, 1987:173; Ives and others, 1983:785; Tan and Lo, 1990:203; Hiltz and Johnson, 1990:739).

User Satisfaction Defined. User satisfaction is defined as the "extent to which users believe the information system available to them meets their information requirements" (Ives and others, 1983:785). As such, user satisfaction is a subjective measure of system success. In partial answer to the first research question, therefore, user satisfaction must be measured subjectively by asking the users what their satisfaction level is.

Basis for Accepting User Satisfaction. The research in this area began with the work of Cyert and March, who developed the original concept of user information satisfaction in their book entitled, A Behavioral Theory of the Firm, published in 1963. In their empirical research, Cyert and March found that when an information system successfully meets the needs of the users, the users' satisfaction with that system is reinforced. Therefore, the users will be more likely to use the system in the future and the satisfaction with the system will continue to be reinforced (Cyert and March, 1963:124-127). According to Bailey and Pearson, another early researcher, Evans, found that users will cease using a system completely and search

Sample 16. Author-Year Citations in Text. This sample also illustrates fourth-level headings.

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Sample 17. Numbered Bibliography

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Sample 18. Author-Year Bibliography

Appendix A: Student Feedback Form

Instructions: Please respond to the following questions as honestly and directly as possible. Your comments will provide valuable feedback which will be used to improve the content and presentation of this course. Remember, this is the first administration of the course material. Consequently, the course developers and the Air Staff are relying on your critique to help make this course more relevant and effective for future students.

How did you feel about the relevance of the content of this course? (Be as specific as possible.)

How did you feel about the presentation (slides, instruction, handouts) of this course? How could the presentation be improved?

Do you feel this course provided you with valuable information/knowledge? Why or Why not?

The purpose of this course was to familiarize you with basic IRM concepts and principles. To what extent do you feel this objective was met?

If you would like to provide additional comments, please do so here.

THANK YOU FOR YOUR FEEDBACK!

Sample 19. Appendix

Vita

Capt Randall R. Bradford was born on 24 September 1965 in Heber Springs, Arkansas. He graduated from Shirley High School in 1983 and entered undergraduate studies at the University of Central Arkansas in Conway, Arkansas. He graduated with a Bachelor of Science degree in Public Administration in May 1987. He received his commission on 13 August 1987 upon graduation from Officer Training School.

His first assignment was at Malmstrom AFB as a missile launch officer. His second assignment was at Eaker AFB as a squadron section commander. While at Eaker AFB, he earned a Master of Science degree in Operations Management from the University of Arkansas. In May 1992, he entered the School of Logistics and Acquisition Management, Air Force Institute of Technology.

Permanent Address: Rt. 1 Box 20-B
                     Shirley AR 72153

Sample 20. Vita

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 074-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of the collection of information, including suggestions for reducing this burden to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE September 1995	3. REPORT TYPE AND DATES COVERED Master's Thesis	
4. TITLE AND SUBTITLE AN AIR FORCE GUIDE FOR EFFECTIVE MEETING MANAGEMENT			**5. FUNDING NUMBERS**
6. AUTHOR(S) Zackery S. Belcher, Captain, USAF			
7. PERFORMING ORGANIZATION NAMES(S) AND ADDRESS(S) Air Force Institute of Technology 2750 P Street WPAFB OH 45433-7765			**8. PERFORMING ORGANIZATION REPORT NUMBER** AFIT/GCM/LAS/95S-2
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) ASC/QI 1865 4th Street WPAFB OH 45433-7765			**10. SPONSORING / MONITORING AGENCY REPORT NUMBER**
11. SUPPLEMENTARY NOTES			
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution unlimited.			**12b. DISTRIBUTION CODE**

ABSTRACT (Maximum 200 Words)

The purpose of this research was to improve the effectiveness of organizational meetings, thereby reducing the waste from ineffective meetings. Specifically, this thesis sought to answer three research questions addressing the essential elements for effective meetings, the benefits from productive meetings, and the information and skills critical to conducting meetings. The research questions were answered through a comprehensive literature review, and the use of the Delphi Technique. However, the solicitation of meeting materials from 16 Malcolm Baldrige National Quality Award winners and 90 Fortune 1,000 firms provided additional information. Seven experts, representing Air Force and industry, participated in two rounds of the Delphi Technique. The research identified the need for a concise and realistic length management tool to instruct managers on how to conduct effective meetings. Further, research highlighted that few corporations in industry have such a tool, even among those firms recognized as being the pinnacle of quality.

The culmination of this effort was the development of an effective meeting management guide to outline and discuss the key elements for preparing and conducting organizational meetings. Recommendations to implement effective meeting management training using the guide are discussed.

14. SUBJECT TERMS Meeting Management, Delphi Technique, Malcolm Baldrige, Business Meetings, Management, Leadership Training, Organizational Meetings, Quality, Meeting Guide, Meeting Training, Management Training, Organizational Theory, Group Dynamics			15. NUMBER OF PAGES 206
			16. PRICE CODE
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED	20. LIMITATION OF ABSTRACT UL

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. Z39-18
298-102

Sample 21. SF 298; Report Documentation Page

MEMORANDUM FOR LAC   Date _____

FROM: _____
            Author's Name   Rank/Grade

SUBJECT: Thesis Distribution   _____
                                             Thesis Designator

THESIS TITLE: _____

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PART I - To be completed by all students.

1. In accordance with the government directive AFP 80-30, I request my thesis be assigned the following Distribution Code:

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2. A survey was/was not (circle one) used in this thesis. If so the Survey Control Number was
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Sample 22. Thesis Distribution Memorandum (Front)

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TO: LAC

Concur.

_____   _____
     Thesis Advisor's Signature   Thesis Advisor's Typed Name

2nd Ind, LAC (Required for Category B-G)

Approved.

DAVID K. VAUGHAN
Asst Dean for Research & Consulting
School of Logistics & Acquisition Management

Sample 22a. Thesis Distribution Memorandum (Back)

This checklist will be used to facilitate review of all information generated within AFIT and intended for release. It will be used as a basis to release such information which is determined to be __unclassified, distribution A (unlimited distribution)__. Specific policies and procedures are set out in DoD Directive 5200.1-R, **Industrial Security Program Regulation,** *(with Change 1);* DoD Directive 5230.9, **Clearance of DoD Information for Public Release;** *AFI 31-401,* **Managing the Information Security Program;** *AFI 35-205,* **Air Force Security and Policy Review Program;** *AFI 37-131,* **Freedom of Information Act Program;** *AFI 37-132,* **Air Force Privacy Act Program;** *AFI 61-204,* **Disseminating Scientific and Technical Information;** *the Department of State International Traffic in Arms Regulations;* **and the DoD Militarily Critical Technologies List.**

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If all answers below are __YES__, then the information may be released into the public domain. For assistance with items 1-7, contact AFIT/PA. For assistance with item 8, contact AFIT/XOI. Circle "Y" or "N" for each question.

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Y N - Subjects with the potential to become items of national interest or with foreign policy implications?
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Y N - Subjects of potential controversy among DoD components or with other federal agencies?
Y N - New weapons or significant modifications/improvements to existing weapons, systems, equipment, or techniques?
Y N - Military operations, operations security, potential operations, and significant exercises?
Y N - National Command Authorities and command posts?
Y N - Military applications in space, nuclear weapons, including weapon-effects research; chemical warfare; defensive biological and toxin research, and high-energy lasers and particle beam technology?
Y N - Material, including that submitted by defense contractors, involving militarily critical technology?
Y N - Communications security, signals intelligence, and computer security?
Y N - Others as OATSD/PA may designate?

Y N   8. Is the information **FREE OF ANY** Department of State International Traffic in Arms Regulations **AND** DoD Militarily Critical Technologies List information (for assistance, contact AFIT/XOI)?

I recommend release of this material (circle one):	*Yes*	*No*	*Uncertain*

Information Originator Signature: _____ *Date:* _____

I release this material (circle one):	*Yes*	*No*	*Uncertain (forward to PA for review)*

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Sample 22b. Release Checklist

TO: CLASS 98 S   1 May 1997

LAC needs to know how many copies of theses must be printed and to whom they must be sent. Please provide the addresses requested below and return this form to LAC by 19 May 1997.

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Sample 23. Thesis Courtesy Copy Information

A NUMERICAL SOLUTION OF

INCOMPRESSIBLE TURBULENT CHANNEL

FLOWS BY INVARIANT MODELING

by

Robert N. Poplawski, Ph.D.
Major, USAF

Major John V. Kitowski, Advisor

A numerical technique was developed for incompressible turbulent channel flows which predicts the

entire flow field downstream of any initial station. The technique includes any of the flow fields from a

two-dimensional confined ejector region to the fully developed turbulent flow regime. The continuity,

momentum, four one-point velocity correlations, and volumetric constraint equations are used as

fundamental governing equations. Closure is achieved by using Donaldson's Invariant Models, which

require the specification of six constants to accommodate the experimental data. The numerical solutions

were obtained by converting the momentum and one-point velocity correlation equations

(with corresponding boundary conditions) to an implicit linear tri-diagonal set of 5N-7 equations in 5N-7

unknowns, where N represents the number of transverse grid lines. These equations were solved by

inverting N five by five matrices once the axial pressure gradient was specified. Because the pressure was

inconstant over affected areas, the equations were adjusted.

Sample 24.   Special Dissertation Abstract

AFIT Control Number _____

AFIT RESEARCH ASSESSMENT

The purpose of this questionnaire is to determine the potential for current and future applications of AFIT thesis research. **Please return completed questionnaire** to: AIR FORCE INSTITUTE OF TECHNOLOGY/LAC, 2950 P STREET, WRIGHT-PATTERSON AFB OH 45433-7765. Your response is **important.** Thank you.

1. Did this research contribute to a current research project?   a. Yes   b. No

2. Do you believe this research topic is significant enough that it would have been researched (or contracted) by your organization or another agency if AFIT had not researched it?

                                                                a. Yes   b. No

3. **Please estimate** what this research would have cost in terms of manpower and dollars if it had been accomplished under contract or if it had been done in-house.

        Man Years_____ $_____

4. Whether or not you were able to establish an equivalent value for this research (in Question 3), what is your estimate of its significance?

   a. Highly   b. Significant   c. Slightly   d. Of No
       Significant   Significant   Significance

5. Comments (Please feel free to use a separate sheet for more detailed answers and include it with this form):

_____   _____
Name and Grade   Organization

_____   _____
Position or Title   Address

Sample 25. AFIT/LA Research Assessment Form

CHECKLIST OF DISSERTATION DOCUMENTS & RECEIPT

Candidate's Name, Designator_____ AFIT/____/____/____

Please deliver these items to ENR as a package, except as noted:

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Date: _____

Sample 26. Checklist of Dissertation Documents & Receipt

Readability goes well beyond word usage and grammar. Consider how words, sentences and paragraphs will look when they appear on the page. Type face and type size play vital roles. Also remember that when a thesis is transferred to microfiche it is reduced 24X. When enlarged it comes back to only 85% of original size. The original type size must be sufficient to retain readability through this process. This paragraph is done in Courier - 10 pt.

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Labels in charts and graphs exist in cramped quarters, yet must be noticed, be legible and readable. A sans-serif face such as Univers, in bold face caps, usually fills the bill.

BIFURCATED FALVBARMS TRENDS [Univers bold face 12 pt]
BIFURCATED FALVBARMS TRENDS [Univers bold face 10 pt]
BIFURCATED FALVBARMS TRENDS [Univers bold face 9 pt]
BIFURCATED FALVBARMS TRENDS [Univers bold face 8 pt)

Sample 27. Illustrations of Type Faces and Sizes

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